Northeast Elk Creek
Density Management
Environmental Assessment

EA #OR – 104 – 08 – 05

U.S. Department of Interior
Bureau of Land Management
Roseburg District
Swiftwater Field Office
Roseburg, Oregon

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U.S. Department of the Interior, Bureau of Land Management
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Chapter 1. Purpose and Need for Action

A. Background

The Bureau of Land Management (BLM), Swiftwater Field Office proposes density management of approximately 1,645 acres of mid-seral forest stands, 40-77 years old, in five separate proposed timbersales: Bear Bones (344 acres), Bucko (266 acres), Cox Pit (247 acres), General Lee (353 acres), and Mr. Bennet (435 acres). Within the 1,645 acres, approximately 35 acres would be cleared or brushed for spur right-of-ways or roads to access the harvest areas.

These proposed sales are located in the Elk Creek/Umpqua River Fifth-field Watershed within Connectivity/Diversity Block (C/D) and Riparian Reserve Land Use Allocations.

It is anticipated that the proposed timbersales would yield approximately 16.4 million board feet (MMBF) of timber in support of local and regional manufacturers and economies.

B. Conformance

This environmental assessment (EA) analyzes the environmental consequences of the proposed action alternative and the No Action alternative, to explain the environmental effects of each in the decision-making process. In addition to the 1995 *Roseburg District Record of Decision and Resource Management Plan* (ROD/RMP), this analysis is tiered to and incorporates by reference the assumptions and analysis of consequences provided by the following NEPA analyses:

- The *Final Supplemental Environmental Impact Statement* (FSEIS) *on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl* (USDA and USDI 1994);
- The *Final Supplement to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standard and Guidelines* (USDA and USDI 2007);

Implementation of the actions proposed in this analysis would conform to the requirements of the ROD/RMP, incorporating the standards and guidelines of the Northwest Forest Plan as amended.

C. Objectives

The overall objective of the proposed action is to provide timber, improve stand quality and vigor, and accelerate the development of late successional habitat on forest land within C/D and Riparian Reserve land-use allocations, in accordance with the ROD/RMP. Specific objectives of the proposed action are to:

1) Comply with Section 1 of the O&C Act (43 USC § 1181a) which stipulates that O & C Lands be managed "… for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities…"

2) Within C/D, perform thinning on forest stands less than 120 years of age. Design thinning to

usually assure high levels of volume productivity. Retain patches of denser habitat where desired to meet wildlife habitat criteria (ROD/RMP, pg. 153).

3) Within the Riparian Reserve, apply silvicultural treatments to restore large conifers in Riparian Reserves (ROD/RMP, pg. 21) and perform density management to help forest stands develop late-successional characteristics and attain forest conditions that contribute to the Aquatic Conservation Strategy (ROD/RMP, pgs. 151-152).

4) Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for the protection of soil and water quality, and for meeting other land use objectives (ROD/RMP, pg. 61). Also, provide a harvest plan flexible enough to facilitate harvesting within a three year timber sale contract.

5) Seek a balance between reducing the risk of wildfire and a fuel profile that supports land allocation objectives (ROD/RMP, pg. 78).

D. Decision Factors

Factors to be considered when selecting among alternatives would include:

- The degree to which the objectives previously described would be achieved, including: the manner in which density management would be conducted with respect to cost, the method(s) of yarding, and type of equipment; season(s) of operations; and the manner in which access would be provided, including road renovation, and the types and locations of road construction;

- The nature and intensity of environmental impacts that would result from implementation and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to, wildlife and wildlife habitat, soil productivity, water quality, air quality, and the spread of noxious weeds;

- Compliance with management direction from the ROD/RMP; and

- Compliance with applicable laws including, but not limited to, the Clean Water Act, the Endangered Species Act, O&C Act, and the National Historic Preservation Act.

- Provide revenue to the government from the sale of timber resources in a cost efficient manner.

Chapter 2. Discussion of the Alternatives

This chapter describes the basic features of the alternatives being analyzed.

A. The No Action Alternative

The No Action Alternative provides a baseline for the comparison of the alternatives. This alternative describes the existing condition and continuing trends anticipated in the absence of the proposal but with the implementation of other reasonably foreseeable federal and private projects. Under the ROD/RMP, the majority of harvest and silvicultural activities are scheduled to occur within the Matrix land use allocation. If the no action alternative were selected there would be no density management of timber or treatment of the mid-seral stands within the bounds of the project area at this time.

Harvest at the proposed locations for purposes of analysis would be deferred for the foreseeable future. Selection of this alternative would not constitute a decision to re-allocate these lands to non-commodity uses. Future harvesting in this area would not be precluded and could be considered again under a subsequent EA. Road maintenance would be conducted as-needed to provide resource protection, accommodate reciprocal users, and protect the federal investment.

B. The Proposed Action Alternative

The action alternative proposes the offering of five timbersales (i.e. Bear Bones, Bucko, Cox Pit, General Lee, and Mr. Bennet) that would result in density management of approximately 1,645 acres of mid-seral stands expected to yield approximately 16.4 MMBF of timber. Within the 1,645 acres, approximately 35 acres would be cleared or brushed for spur rights-of-way or roads to access the harvest areas. The proposed action consists of the following activities (for a summary listing of these actions, see Table 1):

Table 1. Northeast Elk Proposed Activity Summary.

Activity		Total
Timber Harvest	Density Management: Connectivity/Diversity Density Management: Riparian Reserve	971 acres 674 acres
Yarding	Cable Ground Based* Temporary Spur Right-of-Way	1,117 acres 528 acres 35 acres
Hauling	Dry Season Haul Only Wet or Dry Season Haul Total Haul Route	4.71 miles 51.08 miles 55.79 miles
Road Activities	New, Temporary Construction New, Permanent Construction Decommissioning (i.e. waterbar, block, and mulch) Renovation of Existing Roads	2.54 miles 7.77 miles 4.71 miles 8.88 miles
Fuels Treatment	Machine Pile and Burn at Landings	

*Up to 10 acres of additional, incidental ground-based logging could occur within each sale area within those areas designated for cable yarding for a total of 578 acres. This would include activities such as removal of guyline anchor trees and small isolated portions of units not readily yarded with a cable system.

Northeast Elk includes lands within the Connectivity/Diversity Block (C/D, 971 acres) and Riparian Reserve (674 acres) land-use allocations. The land-use allocations of each of the five proposed sales are displayed in Table 2. Northeast Elk is located on Revested Oregon and California Railroad Lands (O&C Lands).

Table 2. Northeast Elk Land Use Allocations.

Sale Name	Township-Range-Section	Land-Use Allocation (acres)		Total Acres
		C/D	Riparian Reserve	
Bear Bones	T21S-R04W-Sec. 27	190	154	344
Bucko	T21S-R04W-Sec. 35	164	102	266
Cox Pit	T22S-R04W-Sec. 20, 21	130	117	247
General Lee	T22S-R04W-Sec. 9, 15	217	136	353
Mr. Bennet	T22S-R04W-Sec. 23, 27 T23S-R04W-Sec. 3	270	165	435
Total		971	674	1,645

1. Timber Harvest

a) Treatment Prescription

Units proposed would have density management treatments applied (Appendix E; Figures 1-7). These units consist of approximately 1,645 acres of mid-seral forest, aged 40 to 77 years.

Density management treatments would be used to reduce the number of trees in generally even aged stands dominated by Douglas-fir. These treatments would be developed consistent with management objectives for the individual land use allocations. Trees would primarily be removed from the suppressed and intermediate canopy classes, although some co-dominant and dominant trees would be removed where necessary to meet specific land use objectives.

Older remnant trees may be present, but are not the numerically predominant stand components or the focus of the treatments. Since treatments would focus on removal of intermediate and suppressed canopy layers in the majority of the unit, it is possible that suppressed trees designated for cutting may include trees older than the prevailing stand age.

Stands in Bear Bones, would be thinned by leaving 120 square feet of basal area and stands in Bucko, Cox Pit, General Lee, and Mr. Bennet would be thinned by leaving 90 square feet of basal area. A variable spacing marking prescription would be used. In Riparian Reserves and C/D land use allocations, minor conifer and hardwood species would be retained where possible to maintain stand diversity and canopy openings would be created or enlarged to maintain trees with large limbs, full crowns, promote tree regeneration, shrubs, and forbs.

Conifer and hardwood snags 10 inches or larger in diameter breast height and at least 16 feet in height would be marked for retention. Existing snags would be felled only if they pose a safety concern. Snags felled for safety reasons in the Riparian Reserve would be retained on site as coarse woody debris. Existing coarse woody debris in decay classes 3, 4, and 5 would be retained in C/D lands, and all coarse woody debris would be retained in the Riparian

Reserve.

The residual stands following harvest would provide a pool of candidate trees for future snag and coarse woody debris recruitment. Additional coarse woody debris and snags may be created incidentally through the harvest operations (e.g. damage leading to broken-out tops or individual tree mortality) or through weather damage (e.g. wind and snow break).

b) Stream Buffers

Variable width (20 to 60 feet) "no-harvest" buffers would be established along continuous streams (no interruptions in the stream channel) to retain direct shading as necessary for maintenance of water temperatures. The final width of the "no-harvest" buffers would be based on consideration of factors such as unique habitat features, streamside topography and vegetation, the nature of the stream (intermittent or perennial), fish presence, and susceptibility to solar heating. Ephemeral and intermittent streams that are spatially interrupted would not have a "no-harvest" buffer since they have very few well-defined channel characteristics but would have trees immediately adjacent to the bank retained. These spatially interrupted streams lack the ability to propagate impacts downstream because any temperature or sediment effects, if they occur, would be "filtered" out by the subterranean flow.

Buffer widths of at least 60 feet would be used for fish-bearing streams and 40 to 60 foot buffers would be used for streams flowing into the summer or having poor slope stability. Minimum buffer widths (20 foot) would be used on first or second order, ephemeral or intermittent continuous streams, which lack riparian vegetation and where riparian habitat components are also absent.

The minimum buffer widths would be used primarily on ephemeral or intermittent streams, which lack riparian vegetation and where riparian habitat components, soil stability issues, and potential impact to downstream fisheries are also absent. Where yarding across buffered streams is necessary, logs would be fully suspended over the stream to avoid disturbing the stream channel and banks. No equipment operation would be allowed within the "no-harvest" buffers. If necessary to fell trees within the "no-harvest" buffers for operational purposes, the felled trees would be left in place to provide in-stream wood and protection for stream banks.

c) Timber Cruising

Timber cruising would employ methods that could include the felling of sample trees to formulate local volume tables. Felled sample trees would become part of the offered sale volume.

A small amount of additional timber could potentially be included as a modification to this project. These additions would be limited to the removal of individual trees or small groups of trees that are blown down, injured from logging, are a safety hazard, or trees needed to facilitate the proposed action. Historically, this addition has been less than ten percent of the estimated sale quantity.

d) Firewood

Firewood cutting and salvaging of logging debris (slash) could occur in cull decks, logging landings, and in the units, near roads, after the density management activities are completed.

2. Timber Yarding

The Proposed Action would require a mix of skyline cable yarding (1,117 acres) and ground-based yarding (528 acres; Table 3). Up to 10 acres of additional, incidental ground-based logging within each of the five timbersales may be necessary (i.e. removal of guyline anchor trees, isolated portions of units, etc.) and would occur on gentle slopes (less than 35 percent) within each timber sale, during the dry season.

A high-voltage transmission line is adjacent to Bear Bones Units 27A and 27B and a natural gas pipeline is within Bear Bones Unit 27A (Appendix E, Figure 2). Trees would be felled away from the transmission lines, and ground-based equipment would not be allowed to operate within the transmission line and pipeline corridor, except on designated skid trails and roads.

Table 3. Northeast Elk Yarding Methods.

Unit	**Yarding Method** (acres)		**Roads/Rights-of-Way** (acres)
	Cable	Ground-Based	
Bear Bones 27A	196	43	5
Bear Bones 27B	100	5	
Bucko 35A	136	130	7
Cox Pit 20A	36	0	6
Cox Pit 21A	61	9	
Cox Pit 21B	0	33	
Cox Pit 21C	39	5	
Cox Pit 21D	54	10	
General Lee 9A	69	26	5
General Lee 9B	29	10	
General Lee 9C	31	43	
General Lee 15A	72	73	
Mr. Bennet 23A	99	89	12
Mr. Bennet 23B	4	5	
Mr. Bennet 27A	146	28	
Mr. Bennet 3A	45	19	
TOTAL	1,117	528	35

3. Timber Hauling

Approximately 51.08 miles of rocked or paved roads would be hauled across either in the dry- or wet-season while 4.71 miles of natural surface roads would be limited to dry-season hauling.

4. Fuels Treatment

Prescribed burning of slash (burning under the direction of a written site specific prescription or "Burn Plan") would occur at machine-piled landing piles. The fine fuels generated during the thinning process would remain scattered throughout the treatment units.

5. Road Activities (Construction, Reconstruction, Maintenance, & Decommissioning)

The proposed project would include dry season and wet season logging activities and use existing roads to the greatest extent practical. Road construction, reconstruction, maintenance, and decommissioning would be restricted to the dry season (normally May 15 to Oct. 15). The operating season could be adjusted if unseasonable conditions occur (e.g. an extended dry season beyond October 15th or wet season beyond May 15th).

Construction – Approximately 7.77 miles of new, permanent roads and 2.54 miles of new, temporary spur roads would be constructed (Tables 4a – 4e). New, permanent roads would be rocked and would remain open after harvest is completed whereas new, temporary spurs would be decommissioned after harvest.

Roads or spurs that may be rocked at the purchaser's expense include spur BB1, the 21-4-34.0B road, and the unnumbered Weyerhauser Co. road proposed for use in Bucko (Tables 4a & 4b). Spurs or roads that are rocked at purchaser's expense would be decommissioned by water-barring and blocking with trench barriers.

Renovation – A total of 2.17 miles of existing, native surfaced roads would be renovated by brushing, grading, and replacing drainage structures (Tables 4a – 4e). A total of 3.11 miles of existing, native surfaced roads would be renovated by brushing, grading, replacing drainage structures, and adding rock to running surface (Tables 4a – 4e). A total of 3.60 miles of existing, rocked roads would be renovated by brushing, grading, replacing drainage structures, and adding rock where needed to the running surface (Tables 4a – 4e).

Decommissioning – Approximately 2.54 miles of newly constructed spur roads and 2.17 miles of renovated roads would be decommissioned following their use. These roads and spurs would be decommissioned by water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers.

Approximately 0.7 miles (one acre) of old roadbed not needed for harvest (within Bucko Unit 35A and Cox Pit Unit 21A) or access to the power line (within Bear Bones Unit 27A) would be subsoiled.

Maintenance – In addition, about 36.6 miles of existing roads would be maintained. Road maintenance might consist of maintaining drainage structures (culverts and drainage ditches), reshaping the road surface, surfacing with rock where needed, and brushing road shoulders.

Table 4a. Bear Bones Roads & Spurs[1]

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
Spur BB1	0.31	0	none	Native[2]	Water-bar, mulch, block
Spur BB2	0.16	0	none	Rock	none
Spur BB3	0.15	0	none	Rock	none
Spur BB4	0.12	0	none	Rock	none
Spur BB5	0.41	0	none	Rock	none
Spur BB6	0.12	0	none	Rock	none
Spur BB7	0.10	0	none	Rock	none

21-4-27.4	0	0.33	Native	Rock	none
21-4-27.0	0	0.10	Rock	Rock	none
Weyco. Rd	0	1.50	Rock	Rock	none
TOTAL	**1.37**	**1.93**			

[1]Approximately 5.20 miles of existing roads would be maintained for Bear Bones in addition to the roads and spurs described in the table.
[2]Road/spur may be rocked at the purchaser's expense.

Table 4b. Bucko Roads & Spurs[1]

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
Spur B1	0.74	0	none	Rock	none
Spur B2	0.21	0	none	Rock	none
Spur B3	0.30	0	none	Rock	none
Spur B4	0.67	0	none	Rock	none
Spur B5	0.19	0	none	Rock	none
Spur B6 (Eugene)	0	0.80	Native	Rock	none
21-4-34.0B	0	0.40	Native	Native[2]	Water-bar, mulch, block
Weyco. Rd	0	0.40	Native	Native[2]	Water-bar, mulch, block
TOTAL	**2.11**	**1.60**			

[1]Approximately 8.00 miles of existing roads would be maintained for Bucko in addition to the roads and spurs described in the table.
[2]Road/spur may be rocked at the purchaser's expense.

Table 4c. Cox Pit Roads & Spurs[1]

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
Spur CP1	0.60	0	none	Rock	none
Spur CP2	0.24	0.25	Native	Rock	none
Spur CP3	0	0.07	Native	Rock	none
Spur CP4	0.23	0	none	Rock	none
Spur CP5	0.12	0	none	Rock	none
Spur CP6	0.03	0	none	Rock	none
Spur CP7	0.32	0	none	Rock	none
Spur CP8	0.19	0	none	Rock	none
22-4-21	0	0.30	Native	Rock	none
TOTAL	**1.73**	**0.62**			

[1]Approximately 3.81miles of existing roads would be maintained for Cox Pit in addition to the roads and spurs described in the table.

Table 4d. General Lee Roads & Spurs[1]

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
Spur GL1	0.35	0	none	Rock	none
Spur GL2	0.22	0	none	Rock	none
Spur GL3	0.15	0	none	Rock	none
Spur GL4	0.16	0	none	Rock	none
Spur GL5	0.17	0	none	Rock	none
Spur GL6	0.28	0	none	Rock	none
Spur GL7	0.12	0	none	Native	Water-bar, mulch, block
Spur GL8	0	0.34	Native	Rock	none
Spur GL9	0.14	0	none	Native	Water-bar, mulch, block
Spur GL10	0.03	0	none	Rock	none
Spur GL11	0	0.1	Native	Rock	none
22-4-9.0	0	0.22	Native	Rock	none
22-4-25.0	0	0.47	Native	Rock	none
22-4-25.0[2]	0.02	0	none	Rock	none
TOTAL	**1.64**	**1.13**			

[1]Approximately 9.60 miles of existing roads would be maintained for General Lee in addition to the roads and spurs described in the table.
[2] Construct truck turnaround.

Table 4e. Mr. Bennet Roads & Spurs[1]

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
Spur MB1	0.30	0	none	Rock	none
Spur MB2	0.10	0	none	Rock	none
Spur MB3	0.19	0	none	Rock	none
Spur MB4	0.30	0	none	Rock	none
Spur MB5	0.28	0	none	Native	Water-bar, mulch, block
Spur MB6	0.52	0	none	Native	Water-bar, mulch, block
Spur MB7	0.13	0	none	Native	Water-bar, mulch, block
Spur MB8	0.14	0	none	Native	Water-bar, mulch, block
Spur MB9	0.60	0	none	Native	Water-bar, mulch, block
Spur MB10	0.27	0	none	Native	Water-bar, mulch, block
Spur MB11	0	0.17	Native	Native	Water-bar, mulch, block
Spur MB14	0.06	0.23	Native	Rock	none
Spur MB15	0.37	0	none	Rock	none
Spur MB16	0.20	0	none	Rock	none
22-4-23.0	0	0.40	Rock	Rock	none
22-4-25.0	0	0.10	Rock	Rock	none
22-4-26.0	0	1.50	Rock	Rock	none

Spur/Road #	New Construction (miles)	Renovation (miles)	Surfacing	Surfacing	Decommissioning
			Existing	Proposed	
22-4-28.0D	0	0.50	Native	Native	Water-bar, mulch, block
22-4-33.2C	0	0.70	Native	Native	Water-bar, mulch, block
TOTAL	**3.46**	**3.6**			

[1]Approximately 10.0 miles of existing roads would be maintained for Mr. Bennet in addition to the roads and spurs described in the table.

C. Additional Project Design Features as part of the Action Alternative

1. **To protect riparian habitat and reserve trees:**

   a) The integrity of the riparian habitat would be protected from logging damage by directionally felling trees away from or parallel to the Riparian Reserve (BMP I B2; RMP, pg. 130).

   b) Full suspension yarding would be required where crossing buffered streams.

   c) Prior to attaching any logging equipment to a reserve tree, precautions to protect the tree from damage would be taken. Examples of protective measures include cribbing (use of sound green limbs between the cable and the bole of the tree to prevent girdling), tree plates, straps, or plastic culverts. If, for safety reasons, it would be necessary to fall a reserve tree in the Riparian Reserves then it would be left as coarse woody debris.

2. **To minimize soil erosion as a source of sedimentation to streams and to minimize soil productivity loss from soil compaction, loss of slope stability or loss of soil duff layer:**

   a) **Measures to limit soil erosion and sedimentation from roads would consist of:**

   (1) Maintaining existing roads to fix drainage and erosion problems. This would consist of maintaining existing culverts, replacing culverts, constructing drainage-relief ditches, stabilizing unstable cut and fill slopes, and replenishing road surface with crushed rock where deficient (BMP II H; RMP, pg. 137). In-stream work would be limited to periods of low or no flow (between July 1st and September 15th).

   (2) For new road construction, new cut and fill slopes would be mulched with weed-free straw, or equivalent, and seeded with a native or sterile hybrid mix.

   (3) Prior to any wet season haul on surfaced roads, sediment reducing measures (e.g., placement of straw bales and/or silt fences and sediment filters) would be placed near stream crossings, if necessary, to prevent sediment from reaching the streams.

   (4) Over-wintering natural surface spur roads in a condition that is resistant to erosion and sedimentation. This would be done by building, using, and winterizing natural surface spur roads prior to the end of the operating season. Winterization would include: installation of waterbars, mulching the running surface with weed-free straw, seeding and mulching bare cut and fill surfaces with native species (or a sterile hybrid mix if native seed is unavailable), and blocking. Implementation of over-wintering measures would be restricted to the dry season (normally May 15th to October 15th).

   b) **Measures to limit soil erosion, sedimentation, and compaction from logging would consist of:**

(1) Use of cable logging systems that limit ground disturbance. This would include the use of partial or full suspension (BMP I C1a; RMP, pg. 130). Intermediate supports will be used as necessary to obtain partial suspension at slope breaks. Where excessive soil furrowing occurs, it would be hand waterbarred and filled with limbs or other organic debris.

(2) Limiting ground-based logging to the dry season (normally May 15th to October 15th; BMP I C2d; RMP, pg. 131).

(3) If soil moisture levels would cause the amount of compaction to exceed 10 percent or more of the ground-based area (including landings, log decks, and trails), operations would be suspended during unseasonably wet weather in the dry season. The soil scientist and the contract administrator would monitor soil moisture and compaction to determine when operations may need to be suspended.

(4) Machines used for ground-based logging would be limited to a track width no greater than 10.5 feet (BMP I C2j; RMP, pg. 131). Skid trails would be limited to slopes generally less than 35 percent (USDI, 2008; pg. 71). Yarding would be confined to designated skid and forwarder trails (BMP I C2c; RMP, pg. 131). Skid trails would have an average spacing of at least 150 feet apart and harvester/forwarder trails would be spaced at least 50 feet apart where topography allows. Old skid trails would be used to the greatest extent practical.

(5) Harvesters would cut trees so that stumps are no higher than 12 inches above the ground to allow subsoiling excavators to pass over the stumps.

(6) Harvesters would place tree limbs in the trails in front of the equipment to minimize compaction. In harvester trail segments that are within five feet of reserved trees, slash would be placed to protect the large roots at or near the surface.

d) **Measures to protect the duff and surface soil layer (RMP, pg. 36) would consist of:**
Burning of slash during the late fall to mid-spring season when the soil, duff layer (soil surface layer consisting of fine organic material), and large down log moisture levels are high (BMP III D1b, pg. 140). This would confine burn impacts to the soil underneath the piles and lessen the depth of the impacts (i.e., loss of organic matter, and the change of soil physical properties, ecology and soil nutrients).

e) **Measures to protect slope stability would consist of:**
(1) New spur roads would be located on geologically stable areas (BMP II B2; RMP, pg. 132) constructed with a narrow road width (i.e. maximum of 14 foot running surface) to minimize soil disturbance (BMP II C6; RMP, pg. 132). Road construction on side slopes greater than 45 percent would be full-bench construction with no sidecasting.

(2) Cable yarding would not be permitted on very steep slopes (i.e. 70 percent and greater) when soil moisture levels are high enough to squeeze water from soil samples by hand. Soil moisture would be considered too high if cable yarding creates glazed imprints on soil that channels water down slope. This generally occurs when the soil moisture is greater than 30 percent. Eighty percent of very steep slopes occur in General Lee and Mr. Bennet.

(3) Higher tree retention areas would be prescribed where very steep slopes are adjacent to swale bottoms and where they form headwalls, or scarps. Higher retention would also be prescribed around slumping in Cox Pit unit 21D and around the headwalls in General Lee Units 9B and 15A.

3. To protect air quality:

All prescribed burning (i.e. slash piles) would have an approved "Burn Plan," and be conducted under the requirements of the Oregon Smoke Management Plan and in a manner consistent with the requirements of the Clean Air Act (ODEQ & ODF, 1992).

4. To prevent and/or control the spread of noxious weeds:

a) Logging and road construction equipment would be required to be cleaned, with a pressure washer, and free of weed seed prior to entry on to BLM lands (BLM Manual 9015-Integrated Weed Management).

b) Logging and road construction equipment would also be required to be cleaned, with a pressure washer, and free of weed seed prior to leaving the Cox Pit, General Lee, or Mr. Bennet sale areas.

c) Existing infestations of Portuguese broom, Scotch broom, and Himalayan blackberry would be treated, either manually or chemically, prior to density management operations.

5. To protect cultural resources:

If any objects of cultural value (e.g. historic or prehistoric ruins, graves, fossils, or artifacts) are found during the implementation of the proposed action, operations would be suspended until the site has been evaluated to determine the appropriate mitigation action.

6. To protect Special Status Plants and Animals:

a) Special Status (Threatened or Endangered, proposed Threatened or Endangered, State listed, Bureau Sensitive, or Bureau Strategic,) plant and animal sites would be protected to conserve and avoid the listing of species, according to established management recommendations (RMP, pg. 40).

b) If during implementation of the proposed action, any Special Status Species are found that were not discovered during pre-disturbance surveys; operations would be suspended as necessary and appropriate protective measures would be implemented before operations would be resumed.

c) Based on 2008 survey data, there are currently no known northern spotted owl nest sites or activity centers within 65 yards of the proposed unit boundaries. If future surveys locate a spotted owl nest site within 65 yards of a unit boundary, harvest activities (e.g. falling, bucking, and yarding) would be seasonally restricted from March 1st through July 15th, within 65 yards of the proposed unit boundaries adjacent to suitable habitat, unless current calendar year surveys indicate: 1) spotted owls not detected, 2) spotted owls present, but not attempting to nest, or 3) spotted owls present, but nesting attempt has failed. Waiver of seasonal restriction is valid until March 1st of the following year.

d) Prescribed burning (i.e. slash piles) would not occur within 440 yards of any unsurveyed suitable northern spotted owl habitat, known northern spotted owl nest site, or activity center from March 1st through July 15th, unless current calendar year surveys indicate: 1) spotted owls not detected, 2) spotted owls present, but not attempting to nest, or 3) spotted owls present, but nesting attempt has failed. Waiver of seasonal restriction is valid until March 1st of the following year.

7. To prevent and report accidental spills of petroleum products or other hazardous material and provide for work site cleanup:

The operator would be required to comply with all applicable State and Federal laws and regulations concerning the storage, use and disposal of industrial chemicals and other hazardous materials. All equipment planned for in-stream work (e.g. culvert replacement) would be inspected beforehand for leaks. Accidental spills or discovery of the dumping of any hazardous materials would be reported to the Authorized Officer and the procedures outlined in the "Roseburg District Hazardous Materials (HAZMAT) Emergency Response Contingency Plan" would be followed. Hazardous materials (particularly petroleum products) would be stored in appropriate and compliant UL-Listed containers and located so that any accidental spill would be fully contained and would not escape to ground surfaces or drain into watercourses. Other hazardous materials such as corrosives and/or those incompatible with flammable storage shall be kept in appropriate separated containment. All construction materials and waste would be removed from the project area.

D. Resources that Would be Unaffected by Either Alternative

1. Resources Not in Project Area

The following resources or concerns are not present and would not be affected by either of the alternatives: Areas of Critical Environmental Concern (ACECs), Research Natural Areas (RNAs), prime or unique farm lands, floodplains/wetlands, solid or hazardous waste, Wild and Scenic Rivers, and Wilderness.

The proposed action is consistent with Executive Order 12898 which addresses Environmental Justice in minority and low-income populations. The BLM has not identified any potential impacts to low-income or minority populations, either internally or through the public involvement process. No Native American religious concerns were identified by the team or through correspondence with local tribal governments.

2. Cultural Resources

Inventories for cultural resources in the proposed Northeast Elk units were completed October 17, 2008. Cultural resource sites were discovered in proposed Unit 15A of General Lee and outside of the boundary for proposed Unit 35A of Bucko. General Lee Unit 15A would be modified reconfigured to exclude these sites from the unit. No cultural resources were discovered in Bear Bones, Cox Pit, or Mr. Bennet. It was determined that there would be no effect to any cultural resources since none would be included within the Northeast Elk harvest units.

3. Visual Resource Management

The VRM classification for this area is IV. The basic elements of form, line, color and texture as required by the ROD/RMP (pg. 52) would be maintained under the proposed action.

4. Energy Transmission or Transport Facilities

A high-voltage transmission line is adjacent to Bear Bones Units 27A and 27B and a natural gas pipeline is within Bear Bones Unit 27A (Appendix E, Figure 2). No adverse effect on energy resources would be anticipated because no commercially usable energy sources are known to exist in the proposed units, trees would be felled away from the transmission lines, and ground-based equipment would not be allowed to operate within the transmission line and pipeline corridor, except on designated skid trails and roads.

Chapter 3. Affected Environment & Consequences by Resource

This chapter discusses the specific resources potentially affected by the alternatives and the direct, indirect and cumulative environmental effects of the alternatives over time. Cumulative effects are the impacts of an action when considered with past, present, and reasonably foreseeable future actions (40 CFR 1508.7). This discussion is organized by individual resource, and provides the basis for comparison of the effects between alternatives. The cumulative effects of the BLM timber management program in western Oregon have been described and analyzed in the 1994 *Final - Roseburg District Proposed Resources Management Plan / Environmental Impact Statement* (PRMP/EIS), incorporated herein by reference.

A. Forest Vegetation

1. Affected Environment

The proposed units are predominantly Douglas-fir forested stands 40 to 77 years old. Other conifer species in the stands include incense-cedar, western hemlock, western red cedar, and grand fir. Hardwoods and ground vegetation are common where there is sufficient light available (e.g. Pacific madrone, golden chinkapin, big leaf maple, red alder, salal, Oregon grape, and sword fern). Over half of the stands within the proposed Northeast Elk Creek project had been actively managed with precommercial thinning and fertilization treatments from 1971 to 1985. The stands are exhibiting signs of being overstocked (e.g. decreased crown ratios).

Stand ages were established by one of two methods. In stands previously harvested and reforested, operational inventory data was used. If this data was not available, stand exams (performed 1995-2008) determined the average age of the dominant and co-dominant trees that would benefit from density management.

Current stand exam data was input to the ORGANON growth and yield model version 8.2. Model output was used to describe current stand conditions and to predict post treatment conditions after the prescribed management is implemented. Harvest units may contain one or more stands, and may contain a mix of tree species, form, and distribution. The current stand conditions for the Northeast Elk sales are summarized in Table 5.

Table 5. Current Stand Conditions.

Sale Name	Stand Age (years)	Total Trees per Acre	Trees per Acre (over 8" DBH)	Basal Area (sq. ft.)	Quadratic Mean Diameter (inches)	Relative Density Index	Canopy Closure* (%)
Bear Bones	59-77	73-222	64-193	150-300	13.5-20.0	0.42-0.84	71-163
Cox Pit	40-66	160-296	145-265	180-355	11.4-15.9	0.53-1.03	108-192
General Lee	42-45	130-302	114-165	170-230	10.6-15.9	0.52-0.67	97-127
Bucko	45-66	93-327	93-267	200-240	11.3-20.6	0.56-0.75	104-161
Mr. Bennet	38-48	132-319	132-229	190-240	11.8-17.0	0.58-0.78	126-168

*Canopy Closure is the proportion of the forest floor covered by the vertical projection of tree crowns, which is adjusted for crown overlap in closed canopy stands. The Organon model estimates canopy cover by summing the individual tree crown areas and dividing that by the area of an acre. Estimates can exceed 100 percent of the stand due to crown overlap in dense stands and/or the presence of understory trees.

2. No Action Alternative

Current stand relative densities exceed or are near suppression related mortality thresholds. In the absence of treatment, canopies would remain closed and the crowns of individual trees would continue to recede, resulting in increased suppression mortality and decreasing diameter growth as trees compete for water, nutrients, and sunlight.

Suppression mortality would occur primarily in the smaller size classes of trees and would be the main source for snag and coarse woody debris recruitment. Continued suppression would also lead to a reduction in the hardwood and shrub components, which would further simplify the vegetative composition of the stands.

Live crown ratios of the overstory trees would continue to decrease from current levels as lower limbs are shaded out and die. Closely spaced trees with small crown ratios have reduced photosynthetic capacity, which results in decreased diameter growth and lower resistance to disease and insects. As trees increase in height, with little increase in diameter, they become unstable and more susceptible to wind damage (Oliver and Larson, 1996).

The stands would not develop into multi-storied stands without altering the current growth and developmental trajectories (DeBell, et al. 1997). In the absence of treatment, shade-tolerant species (e.g. western hemlock, western red cedar) would remain suppressed in the understory. There would be insufficient sunlight to allow for shrub, conifer, and hardwood regeneration.

3. Proposed Action Alternative

Thinning results in increased diameter growth, improved stem and root strength, cessation of crown recession, release of understory vegetation and increased potential for new tree and shrub understory regeneration (Bailey 1996; Bailey and Tappeiner 1998; Bailey, et al. 1998; Oliver and Larson 1996).

Density Management in C/D and Riparian Reserves would result in relative stand densities ranging from 0.25 to 0.48 (Table 6). Stands thinned to a relative density of 0.15 to 0.3 would increase stand diversity and produce a high level of volume productivity (Chan, et al. 2006). Canopy closure would be reduced to between approximately 45 and 86 percent (Table 6). Reducing the canopy closure would allow sunlight to reach the forest floor to encourage establishment and/or further development of an understory and vertical stratification of canopy layers (Hayes, et al. 1997).

Generally, trees selected for retention would have at least a 30 percent live crown ratio. Trees with at least a 30 percent live crown ratio would be more likely to develop deeper crowns (i.e. increase live crown ratio) and accelerate diameter growth (Daniel, et al. 1979).

Table 6. Post-Treatment Stand Conditions.

Sale Name	Total Trees per Acre	Trees per Acre (over 8" DBH)	Basal Area (sq. ft.)	Relative Density Index	Canopy Closure (%)
Bear Bones	53-128	48-80	120	0.33-0.48	56-83
Cox Pit	60-135	55-95	90	0.26-0.37	53-69
General Lee	64-143	53-81	90	0.26-0.38	49-86
Bucko	50-130	46-100	90	0.28-0.38	45-68
Mr. Bennet	54-123	54-81	90	0.25-0.32	54-72

4. Cumulative Effects

The proposed treatments in Northeast Elk would reduce tree densities, allowing selected trees more room to grow. In the long-term, the treatment would accelerate the development of late-successional (seral) stand conditions including large trees of various species and form. The treatment provides more light to the forest floor that would promote the establishment of understory vegetation including shrubs and trees, which in time produce multiple canopy layers. Additionally, snags and down logs are retained, and live trees would provide a future source of these structures.

Through 2011, the Swiftwater Field Office is planning commercial thinning or density management on approximately 2,350 acres of mid-seral forest stands in the Elk Creek watershed including the Northeast Elk project. No regeneration harvests are currently planned within the Elk Creek watershed through 2011.

The 1994 PRMP/EIS (Vol. I, p. 4-4) assumed that most private lands would be intensively managed with final harvest on commercial economic rotations averaging 50 years. Based on this assumption, the 1994 PRMP/EIS (Vol. I, p. 4-30) concluded that private forest lands would contribute very little, if any, late-seral forest habitat in the watershed. Because the objectives are different for each private landowner, the timing of harvest would vary throughout the watershed. Forest lands would maintain a mosaic pattern of age classes in the watershed as different forest stands are harvested and replanted. The majority of private lands would maintain young plantations or early and mid-seral forest type characteristics.

B. Wildlife

1. Federally Threatened & Endangered Wildlife Species

a) Northern Spotted Owl

(1) Affected Environment

Home Range – There are three known spotted owl sites, which include four activity centers, within 1.2 miles (i.e. the Cascades provincial home range) of the proposed Northeast Elk units. The closest spotted owl activity center (i.e. Buck Bear [IDNO 2083O]) is located approximately 223 yards from Bear Bones Unit 27B. The other three activity centers are located approximately 300 to 1,584 yards (0.4 to 1.0 mile) from proposed unit boundaries.

Core Area – The core area is a 0.5-mile radius circle used to describe the area most heavily used by spotted owls during the nesting season (FWS, 2008). Core areas represent areas defended by territorial spotted owls and generally do not overlap the core areas of other spotted owl pairs. A total of 164 acres of dispersal-only habitat and 20 acres of suitable habitat are proposed for treatment within core areas associated with three spotted owl activity centers (i.e. Buck Bear [IDNO 2083O and 2083A]; Curtis Creek [IDNO 1801O]).

Nest Patch – Within the core area, the nest patch is defined as the 300 meter radius circle around a known spotted owl nest site (FWS, 2008). Activities within this area are considered likely to affect the reproductive success of nesting spotted owls and are used in determination of incidental take. A total of seven acres of dispersal-only habitat and five acres of suitable habitat are planned for treatment within the nest patch associated with the Buck Bear activity centers (i.e. IDNO 2083O and 2083A).

Known Owl Activity Centers (KOAC) have been designated to minimize impacts and protect nest sites found before 1994 (USDI, 2005). There is one 102-acre KOAC (Bear Buck) within the proposed project area, located adjacent to the west boundary of Bear Bones Unit 27A. The proposed project would not treat habitat located within the KOAC.

Designated Critical Habitat – All proposed units are within spotted owl designated Critical Habitat Unit OR-13. Critical habitat is a specific geographical area designated by the USFWS as containing habitat essential for the conservation of a Threatened or Endangered species. The proposed density management would treat 72 acres of suitable habitat and 1,573 acres of dispersal-only habitat within Critical Habitat.

(2) No Action Alternative

The quality and availability of northern spotted owl habitat would be unaffected under the No Action alternative. The 1,573 acres of mid-seral stands and 72 acres of mature stands included in Northeast Elk and the northern spotted owl sites described above would provide dispersal and suitable habitat similar to current levels. Suitable habitat characteristics would continue to develop more slowly when compared to the proposed action (refer to *Forest Vegetation*, pgs. 14-15).

(3) Proposed Action Alternative

Based on current survey data (2008), there are no known spotted owl nest sites within 65 yards of the proposed unit boundaries. Disturbance or disruption to nesting spotted owls would not occur because no owls are known to be present. In addition, the project design features (pg. 12) include seasonal restriction for nesting spotted owls if they occur.

Approximately 72 acres of suitable habitat and 1,573 acres of dispersal-only habitat for spotted owls would be modified due to density management activities (Tables 7 & 8).

The suitable habitat present in the Northeast Elk project area developed after older remnant trees were retained from previous harvest activities in the 1930's – 1960's. Portions of the stands proposed for treatment contain the components necessary for nesting, roosting, and foraging such as large snags, downed wood, large trees with platform structures, canopy layers with shrub component, and a canopy cover greater than 60 percent. Density management would focus on the removal of intermediate and suppressed canopy layers, thus reducing canopy cover. Treatment of these stands would not remove the components needed for nesting, but would temporarily lower roosting and foraging habitat quality through the reduction in canopy cover and canopy layers

Table 7. Northern Spotted Owl Habitat within Proposed Units.

Sale	Unit	Unit Acres	Unit Acres within…						Total	
			Nest Patch		Core Area		Home Range			
			Suitable Habitat	Dispersal-only	Suitable Habitat	Dispersal-only	Suitable Habitat	Dispersal-only	Suitable Habitat	Dispersal-only

				Habitat		Habitat		Habitat		Habitat
Bear Bones	27A	239	0	1	12	98	17	222	17	222
	27B	105	5	6	5	51	5	100	5	100
Bucko	35A	266	0	0	0	0	44	211	44	222
Cox Pit	20A	36	0	0	0	0	0	6	0	36
	21A	70	0	0	0	15	0	70	0	70
	21B	33	0	0	3	0	3	0	6	27
	21C	44	0	0	0	0	0	5	0	44
	21D	64	0	0	0	0	0	30	0	64
General Lee	9A	95	0	0	0	0	0	11	0	95
	9B	39	0	0	0	0	0	0	0	39
	9C	74	0	0	0	0	0	74	0	74
	15A	145	0	0	0	0	0	0	0	145
Mr. Bennet	23A	188	0	0	0	0	0	0	0	188
	23B	9	0	0	0	0	0	0	0	9
	27A	174	0	0	0	0	0	53	0	174
	3A	64	0	0	0	0	0	0	0	64
TOTAL		**1,645**	5	7	20	164	69	782	**72**	**1,573**

Within dispersal-only habitat, the proposed density management would accelerate the development of late-successional characteristics used by spotted owls (e.g. large diameter trees, multiple canopy layers, understory development, and hunting perches). Development of late-successional characteristics and suitable habitat from dispersal-only habitat would be expected in approximately 50 years; roughly 100 years sooner than through natural stand development.

Though the quality of dispersal-only habitat would be temporarily reduced by density management, the capability of the habitat to function for dispersing spotted owls would be maintained. Vertical and horizontal cover would be reduced within the proposed units through the reduction in canopy cover with varying levels of residual tree density. These stands are expected to function as dispersal habitat because post-treatment canopy cover would exceed 40 percent and the average tree diameter would generally exceed 11 inches dbh (Table 6); figures widely used as minimum criteria describing functioning dispersal habitat (Thomas et al. 1990). However, spotted owls would likely use untreated stands over newly treated stands until the canopy cover returned to pre-treatment levels in about 10 to 15 years (Meiman et al. 2003).

Home Range – Approximately 69 acres of suitable habitat would be treated within the home ranges of three spotted owl sites (i.e. Buck Bear [IDNO 2380O & 2380A]; Curtis Creek [IDNO 1810O]; Tables 7 & 8). Approximately 782 acres of dispersal-only habitat would be modified within the home ranges of four spotted owl sites (Tables 7 & 8).

Core Area – Approximately 20 acres of suitable habitat would be treated within two spotted owl core areas (i.e. Buck Bear [IDNO 2380O & 2380A]; Tables 7 & 8). Approximately 164 acres of dispersal-only habitat would be treated within three spotted

owl core areas (i.e. Buck Bear [IDNO 2380O & 2380A]; Curtis Creek [IDNO 1810O]; Tables 7 & 8).

Nest Patch – Approximately 5 acres of suitable habitat would be treated within a spotted owl nest patch (i.e. Buck Bear [IDNO 2380A]; Tables 7 & 8). Approximately 7 acres of dispersal-only habitat would be treated within a spotted owl nest patch (i.e. Buck Bear [IDNO 2380O & 2380A]; Tables 7 & 8). Density management activities within the nest patch would likely affect the reproductive success of nesting spotted owls.

Table 8. Northern Spotted Owl Habitat within Known Home Ranges.

Northern Spotted Owl Site (IDNO)		Federal Land (acres)	Habitat on Federal Lands Only (acres)			
			Suitable Habitat		Dispersal-Only Habitat	
			Current Condition	Habitat Modified* through Proposed Action	Current Condition	Habitat Modified* through Proposed Action
Buck Bear (2083O)	Home Range (2,895 acres)	696	166	22	447	322
	Core Area (502 acres)	266	114	12	98	98
	Nest Patch (70 acres)	59	38	0	1	1
Buck Bear (2083A)	Home Range (2,895 acres)	1,108	260	60	832	533
	Core Area (502 acres)	270	90	22	151	111
	Nest Patch (70 acres)	51	34	5	6	6
Curtis Creek (1810O)	Home Range (2,895 acres)	1,198	313	3	465	226
	Core Area (502 acres)	181	104	0	17	16
	Nest Patch (70 acres)	6	6	0	0	0
Spike Butte (4687O)	Home Range (2,895 acres)	840	171	0	522	41
	Core Area (502 acres)	92	57	0	0	0
	Nest Patch (70 acres)	37	30	0	7	0

* Under the Proposed Action dispersal and suitable habitat would have a reduction in quality but would maintain its function.

Designated Critical Habitat – The proposed harvest would modify approximately 72 acres of suitable habitat and 1,573 acres of dispersal-only habitat within designated Critical Habitat Unit 13 for the northern spotted owl. Post-treatment canopy cover is projected to range from 45 to 86 percent (Table 6). While at least 40 percent canopy cover will be maintained following treatment, primary constituent elements of spotted owl Critical Habitat would be removed by removing some co-dominant trees and reducing tree densities contributing to canopy cover and multiple canopy layers.

Additionally, large-diameter trees with nesting structure and hunting perches could potentially be removed as well.

Within the *Recovery Plan for the Northern Spotted Owl* (USFWS, 2008; pg. 20), Recovery Action 5 states to manage habitat-capable lands within Managed Owl Conservation Areas (which are coincident with designated spotted owl critical habitat units) to produce the highest amount and highest quality spotted owl habitat the lands are capable of producing. Activities with demonstrated long-term benefits for spotted owls (e.g. thinning of younger forests) are encouraged even if they cause short-term negative effects.

Nesting, roosting, and foraging functionality would be maintained within the stands, but with reduced nesting and roosting opportunities if large trees with nesting and roosting structure(s) are removed. Treatments would accelerate the development of late-successional characteristics by fostering the development of shrub and canopy layers and large trees. There would be sufficient primary constituent elements remaining that Critical Habitat Unit 13 would retain its functionality and would continue to provide for the survival and recovery of spotted owls under the proposed action.

2. Bureau Sensitive Species

Bureau Sensitive species suspected to occur within the project area and that may be affected by the proposed action are discussed below. Other Bureau Sensitive and Bureau Strategic species suspected to occur on the Roseburg District BLM but not in the project area are discussed briefly in Appendix B.

a) No Action Alternative

No suitable habitat or habitat features for BLM Special Status Species would be affected under the No Action Alternative and any species sites in or adjacent to the project area would be expected to persist. The development of suitable and/or late-successional habitat characteristics for these species such as large trees, snags, coarse woody debris, and a well-developed understory would occur more slowly than compared to the proposed action (refer to *Forest Vegetation*, pgs. 14-15). Therefore, the effects of the No Action Alternative are not discussed on a species-by-species basis.

b) Fisher

(1) <u>Affected Environment</u>

Fishers primarily use mature, closed-canopy forests with large diameter trees, snags, downed wood for natal and foraging behaviors and riparian corridors with some deciduous component are also frequently used. The 72 acres of mature habitat with large down wood structures provide suitable natal or foraging habitat. In addition, the 1,573 acres of mid-seral habitat in the project area would provide dispersal opportunities to fisher. The nearest known observation is more than 42 miles northwest of the proposed project area. However, fishers may use stands in the proposed project area because they are capable of traveling six miles within a few hours and more than 29 miles in two days (Verts and Carraway, 1998) which puts Northeast Elk within reasonable reach of traveling fishers.

(2) <u>Proposed Action Alternative</u>

Treatment of the mid-seral stands would improve the quality of habitat by reducing stand densities, thus creating habitat conditions favorable for the development of a multi-canopy understory and larger trees. Within the mid-seral stands, development of late-successional characteristics would be expected in approximately 50 years, roughly 100 years sooner than through natural stand development. Therefore, the proposed action would produce additional suitable fisher natal and foraging habitat sooner than through natural stand development.

Project design features to retain snags and coarse woody debris (pgs. 4-5) would maintain habitat features for breeding fishers and potential prey species (i.e. small mammals) that use these habitat features. The stands in the project area would continue to provide habitat for fishers following harvest.

c) Purple Martin

(1) Affected Environment

Purple martins nest in colonies within snag cavities located in forest openings, meadows, and other open areas. Although the project area does contain snags they are not located in open areas typical of purple martin colonies. There are currently no known purple martin sites within the project area and the nearest known purple martin observations are located approximately 3.6 miles east of Mr. Bennet Unit 3A. However, purple martins would be expected to forage above the canopies within the project area.

(2) Proposed Action Alternative

Snags would be retained in the proposed units due to protection provided by the project design features (pgs. 4-5). However, unless large openings are created around these snags, the proposed units would continue to be unsuitable for purple martins to colonize the existing snags. Purple martins would continue to be expected to forage above the canopies within the units post-harvest.

d) Townsend's Big-eared Bat & Fringed Myotis

(1) Affected Environment

Townsend's big-eared bat and the fringed myotis can roost in snags or trees with deeply furrowed bark, loose bark, cavities, or similar structures typically found in late-successional conifers. Surveys have not been conducted for either bat species since surveys are not practical. Potential bat roosts are typically located within the overstory canopy, thus it is unknown if the Townsend's big-eared bat or the fringed myotis is present within the proposed project area. There are an unknown number of remnant snags and trees with potential bat roosts in the proposed units. No caves were found within the harvest units during field review.

(2) Proposed Action Alternative

Snags would be retained in the proposed units due to protection provided by the project design features (pgs. 4-5). As described under the Proposed Action (pg. 5), additional snags may be created incidentally through harvest operations or weather damage, thus providing additional snag recruitment as future habitat for bats. Large remnant trees would be maintained post-harvest.

e) Crater Lake Tightcoil

(1) Affected Environment

The range of the Crater Lake above tightcoil is above 2000 feet elevation and east of Interstate-5. Habitat for the Crater Lake tightcoil includes rushes, mosses, and other surface vegetation in close proximity (i.e. less than 10 meters [33 feet]) to perennial open water in wetlands, springs, seeps, or riparian areas; generally in areas which remain under snow for long periods of time (USDI et al, 2003).

A portion of the proposed Mr. Bennet unit 23A (approximately 116 acres) and 23B (approximately 5 acres) are within the described range of the Crater Lake tightcoil (i.e. they are 2,000-2,100 feet elevation). Although there is no late seral habitat present within these units, there may be habitat components (e.g. large woody debris) present from previous harvest activities in the 1930's-1970's. There is habitat for the tightcoil in the northeast corner of Unit Mr. Bennet 23A (i.e. riparian areas associated with perennial streams) but none within Mr. Bennet 23B. The closest known Crater Lake tightcoil observation is located approximately 29 miles southeast of Mr. Bennet Unit 23A.

(2) Proposed Action Alternative

Habitat for the Crater Lake tightcoil would generally be maintained due to: the 20-60 foot variable width "no-harvest" buffers that would be established on streams (see *Stream Buffers*, pg. 5); project design features that would retain all existing coarse woody debris (see *Treatment Prescription*, pgs. 4-5); and the post-harvest canopy closure would be between 54-72 percent in the adjacent uplands of the proposed unit (Table 6). In conjunction with the residual canopy cover in the adjacent uplands, the variable width stream buffers would provide shade (see *Hydrology: Stream Temperature*, pg. 31) for riparian vegetation that is Crater Lake tightcoil habitat and would therefore maintain the temperature and moisture regime in.

3. Wildlife Cumulative Effects

Availability of late-seral forest habitat is the primary wildlife concern in the Elk Creek fifth-field watershed. Stands in this area begin functioning as late-seral habitat at approximately 80 years of age when characteristics like large diameter trees, a secondary canopy layer, snags, and cavities have developed.

The BLM manages approximately 41,700 acres of conifer forest lands in the Elk Creek fifth-field watershed (Table 9). Of this total, there are approximately 16,805 acres of late-seral stands representing 40 percent of forest lands managed by the BLM. In the Elk Creek fifth-field watershed there are approximately 15,965 acres of mid-seral forest stands managed by the BLM (Table 9) that would be expected to develop into late-successional habitat within 150 years if untreated or 50 years if density management prescriptions were applied.

Of the 92,300 acres of forested land in private ownership within the Elk Creek fifth-field watershed there are approximately 3,200 acres of late-seral forest (Table 9). The PRMP/EIS assumed (Vol. I, pg. 4-4) that ". . . most private forest lands would be intensively managed with final harvest on commercial economic rotations averaging 50 years." Given this harvest rotation age, late-seral forest habitat is expected to be unavailable on private, industrial forest-lands within the next 40 years.

While the proposed action would reduce tree densities, it would not affect overall stand ages or affect the ability of the project area to grow into late seral habitat. The proposed action may temporarily reduce the utility of the project area for some wildlife species by reducing canopy cover and horizontal structure. However, sufficient residual tree density, snags, and coarse woody debris would remain to provide wildlife habitat, and treated stands would regain pre-project cover characteristics within 10 to 15 years. Consequently, the proposed action would not affect the availability of late-seral habitat in the watershed, and would contribute to the development of additional habitat with late-successional characteristics at a faster rate than would occur if the proposed units were left untreated. Additionally, late seral habitat would continually be developing in the watershed as the RMP is implemented.

Over a period of 100 years, implementation of management direction from the ROD/RMP is projected to result in a 51 percent increase in the amount of old-growth forest managed on the Roseburg District (PRMP/EIS, Chapter 4 – 29). This is projected to provide an additional 131,000 acres of nesting, roosting and foraging habitat for the northern spotted owl, and habitat for other species dependent on late-successional forest habitat on the Roseburg District (PRMP/EIS, Chapter 4 – 57).

Table 9. Forest Habitat within the Elk Creek Fifth-Field Watershed.[1, 2]

Forest Habitat	Private Lands[1] (acres)	Federal Lands: Available for Harvest[2] (acres)	Federal Lands: Reserved from Harvest[2] (acres)	Total[1] (acres)
Late-Seral Forest (QMD ≥ 20")	3,200	3,330	13,475	20,000
Mid-Seral Forest (10" ≤ QMD < 20")	58,030	6,170	9,795	74,000
Early-Seral Forest (QMD < 10")	31,070	3,145	5,785	40,000
Non-Forest Lands	46,990	65	355	47,410
Total	**139,290**	**12,710**	**29,410**	**181,410**

1. Acreages estimated based on the 1997 Interagency Vegetation Management Project dataset and forest change detection since 1972 (Elk Creek/Umpqua River WA, March 2004, pp. 15-16).
2. Data obtained (April 2005) from Biological Assessment for the Roseburg District BLM FY2005-2008, Appendix B-Table B-3 (pp. 139-140). Analysis determined using Forest Operations Inventory data.

C. Fire and Fuels Management

1. Affected Environment

Portions of Cox Pit, General Lee and Mr. Bennet are within the Wildland Urban Interface (WUI) boundary as identified in the Roseburg District Fire Management Plan. Bucko and Bear Bones are outside of the WUI boundary. Current fuel conditions are best described by photos 1-MC-2 or 1-MC-3 in *Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest* (Maxwell and Ward, 1980). Based on this photo series, the estimate for downed woody debris in Northeast Elk is 7-11 tons per acre, although there are some areas that have a lighter fuel load. Some of the project areas have limited access to the public which would decrease the risk of human-caused wildfires.

Those portions of Mr. Bennet that occur within the WUI boundary have homes nearby, but the surrounding fuel loads around the project area are not likely to carry fire. Therefore, the current risk of wildfire in the Northeast Elk project is low to moderate.

2. No Action Alternative

Downed fuels would continue to gradually accumulate adding to the existing fuel conditions of 7-11 tons per acre. The risk of wildfire would also gradually increase as fine fuels continue to accumulate.

3. Proposed Action Alternative

After density management, the down woody debris would increase from 7-11 tons per acre to 15 tons per acre as depicted in the photo 2-DF-3-PC from *Photo Series for Quantifying Forest Residues in the Coastal Douglas-Fir – Hemlock Type* (Maxwell and Ward, 1976). The down woody debris created at landings by the proposed action would be machine piled and burned to reduce concentrated fuel loads. The remaining fuels created by the proposed action would be predominately small (i.e. less than three inches in diameter) and scattered over the harvest area.

4. Cumulative Effects

The additional amount of down woody debris (i.e. four to eight tons per acre) would not dramatically increase the fire risk to the area. The primary carrier of fires is the fine fuels of less than three inches in diameter. These fine fuels generated in the harvest process would mostly degrade within two years after harvest. The homes in the area are not adjacent to the projects and therefore would not have increased fire risk.

D. Soils

1. Affected Environment

Topography varies from near level and gently sloping (0 to 35 percent) to very steep (greater than 70 percent) within the proposed units. Very steep headwalls are located in Bucko Unit 27A, General Lee Unit 9B and 15A, and Mr. Bennet Unit 27A on slopes up to 110 percent.

Table 10. Slope Distribution, Amount, and Percent of Area by Sale

Sale Name	Percent Slope	Sale Area (acres)	Percent of Sale Area
Bear Bones	0 to 70	340	97
	Greater than 70	9	3
Bucko	0 to 70	265	97
	Greater than 70	8	3
Cox Pit	0 to 70	247	98
	Greater than 70	5	2
General Lee	0 to 70	338	94
	Greater than 70	20	6
Mr. Bennett	0 to 70	429	96
	Greater than 70	18	4
Combined Sales	0 to 70	1619	96
	Greater than 70	60	4

Soils on the gentle slopes are generally well drained. However, for all five timber sale areas, there are pockets of soils with poorer drainage (those with high water tables and hydrophitic vegetation). The soils on the gentle slopes are also moderately deep to very deep (20 to more

than 60 inches to bedrock) and generally have clayey subsoils. These soils with high clay content are highly susceptible to compaction under moist conditions and recover very slowly when compacted.

Ground-based yarding was used extensively in all five sale areas when logged in the 1930s - 1960s, except where slopes greater than 70 percent are concentrated (1964 and 1970 aerial photo interpretation). Substantial soil displacement and compaction resulted. The skid trail density is generally high on gentle slopes (0 to 35 percent slopes) where soil displacement and compaction exceed 25 percent of the harvest area. Heavy compaction is common in the existing skid trails, decking areas, and landings where logging occurred in the 1960s. Soil productivity is recovering very slowly where the topsoil had been displaced and the highly compacted subsoil is exposed or where there is less than ten inches to bedrock. Some organic matter incorporation and soil structure development is occurring on skid trails where native understory vegetation is growing well.

Currently, little in-unit erosion is occurring because: (1) vegetation and woody debris dissipate rainfall energy, (2) natural soil structure and porosity outside of roads and old ground-based yarding features (i.e. tails; log decking areas) allow high water infiltration rates into the soil, and (3) the near absence of new disturbance, such as off-highway vehicle traffic in the trails helps keep erosion low. There are a few natural-surfaced roads receiving traffic and eroding: the 21-4-27.4 road in Bear Bones; portions of the 21-4-34.0 road in Bucko; and portions of the 22-4-9.0 road in General Lee. These roads have ruts that are generally 5-12 inches deep and are slowly down-cutting.

About 43 acres of the project area are considered to be fragile due to slope gradient but suitable for forest management with mitigation for surface erosion and shallow-seated landslides (classified as FGR under the Timber Production Capability Classification [TPCC] system; Appendix B, Table B-1). Approximately four acres of the project area are on moderate to steep slopes (35 to 70 percent) that have mildly active slump-earth flow topography and are suitable for forest management with mitigation for slump-earth flow movements (classified as FPR under the TPCC system; Appendix B, Table B-1). No tension cracks or fresh scarps were discovered from the field investigation, indicating no recent slope movements had occurred in the FGR and FPR areas.

In Bucko Unit 35A, approximately 0.5 acre in a headwall is considered to be fragile due to slope gradient and unsuitable for forest management because unacceptable soil and organic matter losses could occur from mass movement even with best management practices (classified as FGNW under TPCC; Appendix B, Table B-1). In Mr. Bennet Unit 27A, there is approximately 0.5 acre that is an active slump on 62 percent slope with recent tension cracks and jack-strawed trees. This 0.5 acre area in Mr. Bennet is considered non-suitable for timber production because of active slope movement (classified as FPNW under TPCC; Appendix B, Table B-1).

Thirty three post-harvest landslides were identified from aerial photo interpretation (1964 to 2004 photos) and field investigation (Appendix B, Table B-1). All were small- to medium-sized (0.02 to 0.3 acres). Seven were caused by roads and 26 were likely caused by timber harvesting. Two medium-sized debris flows initiated in the headwall area of the southwestern portion of General Lee Unit 15A in the early 1980s. The eastern portion of Mr. Bennet Unit 27A and the southwestern portion of General Lee Unit 15A had the highest landslide density observed within the Northeast Elk project area.

2. No Action Alternative

a) Soil Compaction/Displacement & Productivity

Without timber harvesting or road construction, no additional soil compaction or displacement would occur beyond the current level. Erosion would remain low except for the natural-surfaced roads that get occasional vehicle traffic. Compacted soils within the skid trails would continue to recover very slowly over time, as plant roots penetrate through the soil, organic matter becomes incorporated into the soil, and small animals burrow through the soil layers. The duff layer would increase with the accumulation of needles, twigs, and small branches, along with decomposing larger woody material, absent a fire of sufficient intensity to consume the material.

b) Landslides & Slope Stability

Landslides on the potentially unstable areas (FGR and FPR) and unstable areas (FGNW and FPNW) would have a low probability of occurring (less than ten percent chance in a given year). If landslides do occur they would likely be less than 0.10 acre in size and few in number. This assessment is based on:

- No in-unit landslides occurring under mid-seral forest conditions were identified by aerial photo interpretation landslide inventory or field observations; (pers. obs.; Cressy, 2008).
- No actively failing slopes were discovered in the FGR areas except for a few pockets of less than 0.05 acres each (pers. obs.; Cressy, 2007).
- Approximately 75 percent of historic, post-timber harvest landslides within the project area were 0.02 to 0.10 acres in size. The other 25 percent were medium in size (aerial photo landslide inventory; field observations; Cressy, 2007; Appendix B, Table B-2). The average size of landslides would likely be smaller under continued mid-seral densities.
- The Oregon Department of Forestry found that landslide numbers were lowest in mid-seral stands (31 to 100 years old) following the intense 1996 storms (ODF Forest Practices Technical Report No. 4, 1999, pg. 64).
- Many of the sites that were most vulnerable to failure probably failed after the units were clearcut in the early 1960s. This left the FGR and FPR slopes in an overall more stable state.

3. Proposed Action Alternative

a) Soil Compaction/Displacement & Productivity

The proposed road construction would result in new soil displacement and compaction on approximately 17.5 acres (1.1 percent of the total project area; Table 11). Of the 17.5 acres of new displacement and compaction, approximately 15 acres would be effectively removed from timber/forest production. Approximately 2.5 acres of the new fill-slopes would still provide timber/forest production. There would be soil displacement and compaction on approximately 5.7 acres (0.3 percent of the project area) that had previously been disturbed from prior harvest activities.

Spurs and numbered roads would not be subsoiled after harvest because they are anticipated to be used in the future. Old road segments not needed for this or future harvests would be subsoiled. This would bring about 0.7 miles (or one acre) of old roadbed back into a productive state.

Table 11. Amount of Soil Disturbance and Compaction from New Road Construction and Road Renovation.

Sale	Soil Disturbance acres (percent of project area)		
	New Disturbance	Re-disturbance of Existing Roads/Trails	Total Soil Disturbance
Bear Bones	2.8 (0.8%)	0.1 (<0.1%)	2.9 (0.8%)
Bucko	5.1 (1.9%)	0.8 (0.3%)	5.9 (2.2%)
Cox Pit	2.9 (1.1%)	1.3 (0.5%)	4.2 (1.7%)
General Lee	2.3 (0.7%)	0.8 (0.2%)	3.1 (0.9%)
Mr. Bennet	4.4 (1.0%)	2.7 (0.6%)	7.1 (1.6%)
Total	**17.5 (1.1%)**	**5.7 (0.3%)**	**23.2 (1.4%)**

Ground-based yarding is proposed on approximately 528 acres (Table 3) where slopes are generally less than 35 percent. Up to 48 acres of soil displacement and compaction that limits tree growth would result from ground-based yarding. Compaction is defined, for this analysis, as an increase in soil bulk density of 15 percent or more and an alteration of soil structure to platy or massive to a depth of four inches or more that limits tree growth. The relatively high clay content of the surface makes these soils highly sensitive to compaction. Restricting operating periods to the dry season for ground-based operations would reduce soil productivity loss (as included in the project design features, pgs. 5, 10).

Where there is no existing compaction, ground-based yarding with a tractor or rubber-tired skidder would compact approximately six to seven percent of the ground-based area when project design features are followed. A harvester-forwarder operation, where slash is plentiful, would compact approximately one to three percent of the ground-based area (D. Cressy, 2006; pers. obs.). The amount of new compaction that limits tree growth would be reduced by using existing compacted trails to the extent practical. Landings and log deck ground would account for approximately an additional two percent of the ground-based harvest area.

Therefore, up to nine percent of the ground-based harvest area (approximately 48 acres) would be compacted if tractors or rubber-tired skidders were used. Approximately five percent of the ground-based harvest area (approximately 26 acres) would be compacted if harvester-forwarders were used. Both scenarios would be within ROD/RMP direction that the cumulative main skid trails, landings, and large pile areas affect less than ten percent of the ground-based harvest unit (USDI, 2008; pg. 71).

Approximately 1,117 acres would be cable-yarded (Table 3). Cable-yarding corridors would cover about three percent of the treatment area's surface (Adams 2003) or about 34 acres. Soil disturbance from cable-yarding would vary by topography (convex vs. concave slope, slope steepness, and the presence or absence of pronounced slope breaks), and amount of logs yarded. Compaction would typically be absent or light with little soil displacement in the cable-yarding corridors, partly because intermediate supports would be required where necessary for one-end suspension. Light compaction would be confined to the topsoil and would recover without mitigation. There would be areas with heavier compaction, especially along terrain breaks. Excessive furrowing created by cable yarding would be hand waterbarred and filled with limbs or other organic debris to prevent erosion, sedimentation and the channeling of water onto potentially unstable slopes (project design features, pg. 10).

Surface soil erosion in disturbed areas would be controlled by applying erosion control measures (e.g. new cut and fill slopes would be mulched with weed-free straw, or equivalent, and seeded; pg. 10). With the project design features described in Chapter 2, resulting soil erosion would be limited to localized areas, and any reduction of soil productivity due to erosion would be minor. The effects to soils would be consistent with those identified and considered in the Roseburg District Proposed Resource Management Plan/Environmental Impact Statement (Chapter 4, pgs. 12-16).

There would be a flush of sediment from newly constructed spurs, ground-based yarding trails, and cable-yarding corridors during the first wet-season event following harvest. The amount of sediment generated from yarding trails and corridors would be too small to reliably measure. Little sediment would reach streams because overland flow is rare on these high infiltration soils covered with slash and the "no harvest" buffers would prevent disturbance to stream channels and stream banks. The "no harvest" buffers would also intercept run-off from roads allowing for deposition of sediment transported by overland flow before it reached active stream channels.

b) Landslides & Slope Stability

Most new spur construction and road renovation would be located in stable positions that have: (1) gently sloping benches or ridge top positions and side slopes up to 45 percent and (2) have no apparent signs of potential instability, such as curved or pistol-butted conifer boles or instability such as, tension cracks, scarps, or jack-strawed trees that indicate active slope movement. Approximately 0.25 miles would be full-bench construction in segments of spurs BB1, CP7, GL1 and GL3. These segments would also be on stable cross slope positions of 45 to 55 percent. The proposed road construction and renovation would not create instability (based on the monitoring of spurs constructed on similar stable terrain).

Where soils are classified as FGR or FPR (47 acres; Appendix B, Table B-1), the risk of in-unit landslide occurrence would fall between the low risk of the no action alternative and the moderate risk under clearcut conditions (moderate risk determined from interpretation of 1964 and 1970 aerial photos). The risk would range from "low" to "low and moderate". The period of maximum vulnerability would be the ten year period immediately following harvest as root systems and canopies expand. If in-unit landslides do occur during this period of vulnerability, they would be few in number and would likely be less than 0.10 acre in size, for similar reasons as stated previously under the No Action Alternative (pgs. 25-26).

The density management of adjacent areas would have little effect on the stability and risk of failure of the 0.5 acre inclusion of FGNW slope in Bucko Unit 35A and the 0.5 acre inclusion of FPNW slope in Mr. Bennet 27A as discussed previously under the no action alternative (pg. 26). Spur B5 would be located immediately above the FGNW slope but drainage would be directed away from this slope and thinning trees above it would result in no measurable increase in subsurface drainage into it.

4. Cumulative Effects

Road construction, road renovation, and ground-based yarding would create new soil displacement and compaction that limits tree growth on up to four percent (63 acres) of the project area (15 acres due to road construction and renovation; 48 acres due to timber yarding) and approximately one acre of old roadbed would be subsoiled to help restore soil productivity. In the long-term (i.e. one harvest rotation), soil productivity would be maintained or improved at

the watershed scale on BLM-administered land because of ongoing natural recovery and the subsoiling of ground-based yarding features and roads after final harvest of this project area and other areas in the watershed. As a result, cumulative effects to soil productivity at the site scale and fifth-field watershed scale would be negligible. These effects would not exceed the level and scope of effects considered and addressed in the Proposed Resource Management Plan/Environmental Impact Statement (USDI 1994). The effects of forest management on private timber lands in the watershed would be variable.

Landslide aerial photo inventories within the Swiftwater Resource Area show a declining number of landslides during the past 50 years. The declining number of landslides corresponds with improved management practices. The rate of road-related landslides has declined the most. Fluctuations occur because of variations in weather and levels of management activity. Because of management improvements and Riparian Reserves, the distribution of landslides in time and space and their effects, now, more closely resemble those within relatively unmanaged forests (Skaugset and Reeves 1998). The distribution would be approaching natural variability.

E. Hydrology

1. Stream Temperature & Water Quality

a) Affected Environment

The Northeast Elk project area lies within the Bear Creek-Pass Creek, Buck Creek-Pass Creek, Upper Thief Creek, Lees Creek, Curtis Creek, Cox Creek, and Scotts Valley Headwaters drainages of the Elk Creek fifth-field watershed. Approximately four acres of proposed density management fall within the Upper Coast Fork Willamette River fifth-field watershed. Treating four acres of the 97,464 acre Upper Coast Fork Willamette River Watershed would result in no measurable change to any watershed parameter. Therefore, the Upper Coast Fork Willamette River Watershed will not be discussed further.

There are approximately 70 first- or second-order headwater streams and five higher order streams (Bear Creek, Buck Creek, Cox Creek, Lees Creek, and Lane Creek) adjacent to or within the proposed units totaling 13 miles of stream length. Approximately eight percent of this stream length is classified as perennial (flows year-round) and 92 percent is classified as intermittent (i.e. they stop flowing in the dry season) or ephemeral (i.e. they transport water only in response to precipitation events). Elk Creek has been placed on the Oregon 303(d) list for excessive temperature year round (ODEQ, 2006).

The beneficial uses of water within the project area that would potentially be affected are: resident fish and aquatic life, and salmonid fish spawning and rearing. Beneficial uses of water downstream of the project area consist primarily of: livestock watering, domestic water supply, irrigation, and fish and aquatic life. The project area does not lie within a municipal drinking water source area.

Three surface water rights for domestic use exist within one mile downstream of the proposed thinning units. Eight points of diversion for irrigation and multiple use are within one mile downstream of the proposed thinning units.

b) No Action Alternative

There would be no impact to water quality, Beneficial Uses of Water, or hydrologic processes under the No Action Alternative. Trees within the Riparian Reserve would continue to compete for space and stands would persist in an overly dense condition and not attain potential growth rates (see Forest Vegetation section above). This slow development would result in a smaller size of potential wood for long-term recruitment to streams and slower canopy development to provide shade.

Should a stand-replacing event (e.g. wildfire) occur, it would result in an increase in water yield and peak flows due to a loss of vegetation and reduction in evapotranspiration. Subsequent impacts to water quality and Beneficial Uses of Water would then follow.

Road renovation, beyond routine maintenance, would not repair existing sediment sources. Some road stream crossings and drainage features are in poor condition and have an increasing likelihood of failure over time, which could introduce sediment into streams. The amount of sediment would vary depending on the condition of the road and the size of the storm event.

There is the potential for in-unit landslides to directly impact segments of first and second order streams that total approximately 0.82 miles (i.e. 0.02 miles in Bucko, 0.13 miles in Cox Pit, 0.29 miles in General Lee, and 0.38 miles in Mr. Bennet). The likelihood of a landslide reaching a stream segment in a given year would be low because:

- The risk of landslide initiation on the potentially unstable slopes would be low.
- The reach (length of area affected) of small landslides that are less than 0.1 acre in size (the most likely size to occur) would be limited. The reach of a small landslide is usually from 40 to 200 feet in length.
- Only approximately six percent of the total stream length inside or adjacent to the proposed units could be directly impacted by landslides.

If a landslide was to reach a first order stream in the two very steep headwalls of General Lee Unit 9B and the one very steep headwall in General Lee Unit 15A, then a medium-sized debris flow (0.1 to 0.5 acre) could develop although the probability is very low. The run-out distance for a potential debris flow originating in one of the General Lee Unit 9B headwalls would not exceed approximately 700 feet based on the stream gradient and channel confinement factors. The run-out distance for a potential debris flow in General Lee Unit 15A headwall would not exceed approximately 450 feet, again based on stream gradient and channel confinement factors. Since two medium-sized debris flows scoured the channel in General Lee Unit 15A down to bedrock in the 1980's, there is little channel material remaining to "feed" a new debris flow. Therefore, the probability is very low another debris flow would generate there following the proposed action.

If a landslide occurs, it would produce a short-term increase in sedimentation until the material is dispersed downstream. Effects of sediment in the stream bed from small landslides would have a low probability of being detected more than a few hundred feet downstream from the landslide (during normal flow conditions) since small streams have low capacity for carrying sediment because of their small size and low flows.

Landslides are a natural disturbance mechanism which can provide important ecological functions when they occur at natural rates. As discussed previously (see *Soils: Cumulative*

Effects; pgs. 28-29), landslide rates have been declining over the last 50 years to where they are now occur at near natural rates.

c) Proposed Action Alternative

(1) Water Temperature

Flow on ephemeral and intermittent streams ceases for some portion of the year, which makes them less susceptible to propagating temperature impacts downstream during the warm dry season. Some of these ephemeral or intermittent streams are also interrupted (the defined stream channel disappears moving downstream due to water going subsurface) which eliminates any mechanism for delivering impacts further downstream. Perennial streams flow year-round, which makes them more susceptible to temperature impacts.

Vegetation that provides primary shading for stream channels would be protected by the "no-harvest" buffers as described in the project design features (pg. 5). Consequently, shading for continuous streams would not be affected by thinning or density management and therefore stream temperatures would not be affected.

(2) Water Quality

Density management in Riparian Reserves can cause localized soil disturbance and the short-term potential for erosion, primarily associated with yarding operations. However, "no-harvest" buffers would be established for all continuous streams adjacent to proposed units and full suspension would be required across streams with buffers (project design features, pg. 5). These "no harvest" buffers would prevent disturbance to stream channels and stream banks and would intercept surface run-off allowing for deposition of any sediment transported by overland flow before it reached active stream channels.

According to Reid (1981) and Reid and Dunne (1984), forest roads can be a major contributor of fine sediment to streams, through down cutting of ditch lines and erosion of unprotected road surfaces by overland flow. Under this alternative, there would be approximately ten stream crossings by new road construction. All of these crossings would be on existing skid trails and few trees would be cut to facilitate road construction. These entries through the no-harvest buffers and stream crossings would be necessary to avoid road construction on potentially unstable ground and still be able to access areas for treatment.

Road segments must be connected directly to channels in order to deliver sediment-laden water. Approximately 90 percent of the new road construction length would not be connected to the streams through ditchline drainage and therefore have no effect on stream sediment. The remaining new road construction would be connected to the drainage network from ditchline drainage. However, road construction would be limited to the dry season and the spurs would be over-wintered in a condition that is resistant to erosion and sedimentation (project design features, pg. 10).

Timber hauling could occur in both the dry and wet seasons, although during the wet season hauling would be limited to surfaced roads. Hauling during dry season would not deliver road-derived sediment to live stream channels because without precipitation there would be no mechanism for the transport of fine sediment into streams. However, during the first seasonal rains there could be a flush of sediment from the roads near stream

crossings. The amount of sediment contributed from these crossings during the first seasonal rains would be negligible when compared to the amount of sediment from ephemeral and intermittent channel beds and stream banks that has accumulated within the stream network during the dry season. Following the first seasonal rains, erosion rates would stabilize and sediment delivery would be indistinguishable from background levels resulting in no measureable change to water quality.

The risk of landslides impacting streams would be slightly higher than under the no action alternative for a given year. If these landslides occur, they would still be occurring at near natural rates and impacts would be similar to the no action alternative. Some stream reaches would still have low risks and others would have low to moderate risks. The likely size of a landslide reaching a stream would still be small (i.e. less than 0.1 acre). The period of increased vulnerability would be about ten years as the roots and canopies of the residual trees expand. Higher retention areas around the headwalls in General Lee Units 9B and 15A would help keep the debris flow risk low in all three of these areas.

2. Stream Flow (Water Yield & Peak Flow)

a) Affected Environment

Average annual precipitation in the Northeast Elk project area ranges from 50 to 60 inches, occurring primarily between October and April. Precipitation occurs mostly as rainfall since 99 percent of the project area drainages are less than 2,000 feet in elevation (i.e. below the transient snow zone). Therefore, more of the annual streamflow is concentrated to this period (i.e. between October and April) (Harr, et al. 1979).

Water yield and peak flows are dependent upon the capture, storage, and runoff of precipitation. Water yield is the total amount of water that comes out of a watershed or drainage measured over a period of time. Timber harvest can result in increases in water yield due to a decrease in evapotranspiration and interception (Satterlund and Adams, 1992).

Roads can affect the hydrologic function of a watershed in a number of ways. They can increase the drainage density of a watershed and act as a preferential pathway for surface runoff. The increase in surface runoff can decrease the volume of water that infiltrates into groundwater or soil water storage. The increase in surface runoff also can increase the rate at which runoff is routed through a basin, which can result in higher peak flows and less time between a precipitation event and peak runoff (Harr, et al. 1975).

b) No Action Alternative

Existing roads and landings may modify storm peaks by reducing infiltration, which would allow more rapid surface runoff (Ziemer, 1981, pg. 915). Existing roads may also intercept subsurface flow and surface runoff and channel it more directly into streams (Ziemer, 1981, pg. 915). However, peak flows have been shown to have a statistically significant increase due to effects from roads only when roads occupy at least 12 percent of the watershed (Harr, et al. 1975).

Within the drainages of the Northeast Elk project area, roads occupy approximately two percent of the land. Therefore, no statistically significant increase in peak flows would be expected to occur due to road effects. Also, with no change in the vegetative cover there would be no change in the average water yield from the Northeast Elk project area drainages.

c) Proposed Action Alternative

Density management would result in a decrease in evapotranspiration which may lead to an increase in water yield. Removal of trees can increase soil moisture and base stream flow in summer when rates of evapotranspiration are high. These summertime effects last a few years until the canopy closes and the understory develops (Ziemer and Lisle, 1998; pg. 61). Because evapotranspiration from riparian vegetation accounts for most of the daytime decreases in summertime low-streamflow conditions (Bond et al., 2002), riparian buffers reduce the potential for thinning treatments to increase summertime low-flows (Moore and Wondzell, 2005).

Bosch and Hewlett (1982; pg. 16) concluded that water yield increases are usually detectable when at least 20 percent of the forest cover has been removed in a watershed. Stednick (1996; pg. 88) evaluated twelve studies in the Pacific Coast hydrologic region and determined there was no measurable annual yield increase until at least 25 percent of the watershed was harvested. These relationships are based on watersheds that were clearcut logged with minimal stream buffers. To date, no research has been published that describes the effect that thinning and density management treatments designed following Northwest Forest Plan guidelines have on stream flow.

No measurable effect to peak flow would be anticipated as a result of the proposed action because the Northeast Elk project would involve thinning less than four percent of the Upper Elk Creek and Upper Pass Creek sixth-field subwatersheds. Without a measurable effect to peak flow, the proposed action would also have no measurable effect on channel geometry. In addition, since 99 percent the proposed project is located below the transient snow zone there would be no potential to impact the amount or the timing of snow-melt runoff.

3. Cumulative Effects

Several studies have shown that the first, fall rains following harvest have the most increase in generating peak flow from pre-harvest conditions (Rothacher 1973; Harr et al. 1975; Harr et al. 1979; Ziemer 1981). These fall rainstorms are generally small and geomorphically inconsequential (Harr 1976). Large peak flows occur in mid-winter after soil moisture deficits are satisfied in both logged and unlogged watersheds (Ziemer and Lisle, 1998, pg.60). Increases in peak or storm flows in winter and spring can alter channel morphology by flushing smaller substrate, causing the channel to downcut and increase stream bank failures.

Studies on increased peak flows are varied in their findings on how much increase in flow would result from a given amount of timber harvest. Most studies agree that the effects of harvest treatment decreases as the flow event size increases (Rothacher, 1971, pg. 51; Rothacher 1973, pg. 10; Wright et al., 1990; Moore and Wondzell, 2005) and is not detectable for flows with a two year return interval or greater (Harr, et al., 1975, pg. 443; Ziemer, 1981, pg.915; Thomas and Megahan, 1998, pg. 3402; Thomas and Megahan, 2001, pg. 181). At the drainage scale (seventh-field HUC), there may be short- and long-term increases in peak flows of small (less than two year return interval) storm events; this effect would decrease over time. As small streams form larger drainage networks, the ability of individual small watersheds to affect streamflow decreases (Garbrecht, 1991). As a result, peak flow increases following harvesting at the drainage level are likely to be undetectable further downstream.

Road densities and condition within the Elk Creek Watershed would remain virtually the same into the reasonably foreseeable future. There would be a slight increase in road density from 2.2 miles per square mile to 2.4 miles per square mile in the project area, but the percent surface area

in road would remain at approximately two percent. At present, the road densities are not sufficient to cause a measurable increase in peak flows (see *No Action Alternative*; pgs. 32-33).

"No-harvest" buffers would be established on all continuous streams adjacent to the proposed units. These "no-harvest" buffers would prevent disturbance to stream channels and stream banks. They would also intercept surface run-off and prevent sedimentation of streams, such that there would be no cumulative degradation of water quality in the Elk Creek Watershed.

F. Aquatic Habitat & Fisheries

1. Aquatic Habitat

a) Affected Environment

Aquatic Habitat Inventory surveys were conducted by the Oregon Department of Fish and Wildlife (ODFW) between 1991 and 1997 on fish-bearing streams in the Elk Creek Watershed. This inventory was used in addition to recent site surveys by Swiftwater Field Office fisheries biologists in establishing the baseline condition of habitat in the watershed.

Key factors defining the quality of aquatic habitat are temperature (previously discussed in the *Hydrology* section; pgs. 30-31) substrate/sediment, large woody debris, pool quality, and habitat access. In addition, Essential Fish Habitat (EFH) is also discussed here under *Aquatic Habitat*.

(1) Substrate/sediment

The availability of spawning substrate is an important factor in fish productivity. Gravel and small cobble substrate (Bell, 1986) relatively free from embedded fine sediment is ideal spawning substrate for resident and anadromous salmonids. In reaches where spawning substrate is present, the quality of those spawning sites may be limited where fines exceed 20 percent (Waters, 1995). During incubation of eggs and alevin emergence, fine sediment deposition can fill interstitial spaces in the spawning substrate reducing oxygen flow to eggs, smothering eggs, or forming an armor layer preventing emergence of alevin (Waters, 1995)

Habitat surveys within the project area in the Elk Creek Watershed indicate an average fine sediment composition of 40 percent. When compared to the benchmarks for aquatic habitat conditions set by ODFW (Foster et al. 2001), this is considered to be in "poor" condition.

(2) Large Woody Debris

Large woody debris is important to the formation of deep scour pools and the retention of gravel substrate (Bilby and Ward, 1989). These pool and off-channel habitats are important to salmonids, as discussed in *Pool Quality* below. Most woody debris comes from within one site potential tree height of the stream channel (Naiman et al. 2002), but large woody debris can also be recruited from more than 90 meters away in steep confined channels (Reeves et al. 2003).

Habitat forming large woody debris pieces range from large logs (i.e. at least 24 inches diameter) to small hardwoods. ODFW considers stream reaches to be in an "excellent" condition when they contain more than 30 cubic meters of large wood per 100 meters and

three “key pieces” per 100 meters. A “key piece” is at least 33 feet long and 24 inches in diameter.

Streams surveyed within the project area averaged 157 cubic meters of large woody debris and 12.8 key pieces per 100 meters. This results in an ODFW benchmark rating of "excellent" for wood volume and key pieces.

(3) Pool Quality

Pools are important habitat features for salmonids, especially for juvenile rearing. Pools are cool water sources during low flow months and off-channel pools provide refuge during high flow events (Swanston, 1991). Salmonids are found in greater densities (Roni, 2002) and larger sizes (Rosenfeld et al. 2000) in deep pool habitats. Stream reaches with more than 35 percent pool by area and having more than 2.5 “complex pools” per kilometer are considered by ODFW as “good”. A “complex pool” is one that has a large wood component.

Streams surveyed within the project area averaged 23 percent pool habitat by area and zero complex pools per kilometer. This results in an ODFW benchmark rating of "fair" for pool area and "poor" for complex pools.

(4) Habitat Access

Access to the streams by migrating fish can be restricted by culvert outlet jumps greater than six inches and culvert outlet pools less than 1.5 times the height of the jump. While adult fish are capable of jumping more than four feet juvenile fish are often prevented from upstream migration by jumps of more than six inches. Culverts with slopes exceeding 0.5 percent can also limit passage by increasing water velocities inside the culvert (OWEB, 1997). There are two culverts in the project area that are barriers to adult or juvenile resident fish (Bear Creek). There are no culverts that are barriers to anadromous fish.

(5) Essential Fish Habitat

Essential Fish Habitat (EFH) is designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Federal Register 2002, Vol. 67/No. 12). Streams and habitat that are currently or were historically accessible to Chinook and coho salmon are considered EFH. EFH is approximately 0.1 miles to more than one mile away from the proposed sales (Table 12).

Table 12. Nearest Locations of Special Status Fish Species and Essential Fish Habitat to Northeast Elk.

Sale	Stream Type	Stream Name	Location (T-R-S)	Distance to Proposed Sale Areas (miles)			
				OC Coho Salmon	OC Steelhead	Umpqua Chub	Essential Fish Habitat
Bear Bones	Perennial	Bear Creek	21-4-7	>1.0	>1.0	Unknown	>1.0
Mr. Bennet	Perennial	Cox Creek	22-4-27, 23	0.1	0.1	Unknown	0.1
General Lee	Perennial	Lees Creek	22-4-9, 15	0.9	0.5	Unknown	0.9

Cox Pit	Perennial	Lane Creek	23-4-23, 15	0.2	0.2	Unknown	0.2
Bucko	Perennial	Buck Creek	21-4-35	>1.0	1.0	Unknown	>1.0

b) No Action Alternative

Under this alternative, overstocked mid-seral stands would not be thinned to promote conifer growth. Woody debris from these mid-seral stands would be available for recruitment to stream channels, but would be from the small tree size classes typical of the stand (e.g. 10.6-20.6 inches diameter [Table 5]). Small woody material can create pool habitat in smaller stream systems (Bilby and Ward 1989); however, smaller diameter wood does not persist in stream channels because it decays more quickly (Naiman et al., 2002) and is more easily flushed from the system than larger diameter wood (Keim et al., 2002). As a result, the quality of pool habitat would not improve and spawning substrate would not be captured as well as if larger woody debris were available. This trend would continue for several decades until a natural event, such as an understory fire, reduced stand densities and allowed larger trees to develop.

c) Proposed Action Alternative

(1) <u>Substrate/sediment</u>

Stream substrate would not be affected by the proposed density management. A buffer width of 20 feet or greater on intermittent and perrennial streams would provide root strength sufficient to maintain bank stability (FEMAT, 1993), protect stream banks, and prevent additional sediment from entering streams and accumulating in stream gravels. Overland sediment transportation by rain splash or sheet erosion would be unlikely because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities (Dietrich et al. 1982). The vegetated, non-compacted "no-harvest" buffers would provide sufficient filtering capacity such that sediment generated by density management operations would be intercepted and captured before it could reach stream channels (also see *Hydrology*, pg. 30).

The amount of sediment contributed from stream crossings along the haul route during the first seasonal rains would be negligible when compared to the amount of sediment contributed from ephemeral channel beds and stream banks (as discussed in *Hydrology* previously, pgs. 30-31). Steep-gradient intermittent stream channels, such as those in the project area, generally have storage capacity sufficient to retain small amounts of sediment that may be generated locally (Montgomery and Buffington, 1997). Stream reaches along the proposed haul routes possess large woody debris sufficient to trap and store sediment in headwater reaches. To further mitigate the potential for sediment delivery from road surfaces along the haul route, maintenance on existing roads would repair drainage and erosion problems and natural surface roads would be left in a condition that is resistant to erosion and sedimentation after completion of the proposed project (pgs. 6-7). Consequently, the risk for sediment to affect aquatic habitat in the project area would be negligible and there would be no cumulative effects at the fifth-field watershed scale.

(2) <u>Large Woody Debris</u>

No existing large woody debris would be removed from stream channels and there would be an increased availability of large woody debris for recruitment. Streams adjacent to the proposed units would continue to recruit large woody debris from the "no-harvest" buffers. Although there would be fewer trees available for recruitment in the treated portions of the Riparian Reserves, the remaining trees would be larger and continue to provide a source for the recruitment of woody debris. As a result of density management, large woody debris recruitment into streams would increase over time due to the accelerated development of larger trees close to the stream channel.

(3) Pool Quality

The availability of pool habitat would remain unchanged by the proposed density management activities since no existing large wood would be removed from streams. Thinning in upland stands outside of large wood source areas (e.g. more than 90 meters from streams) would not affect future wood recruitment and, hence, would not affect pool quality or frequency.

Density management in Riparian Reserves (within large wood source areas) would generally remove smaller trees from the suppressed and intermediate canopy layers, while reserving co-dominant and dominant trees. The proposed action would reduce the amount of small woody debris available for pool formation in the short-term but would increase the amount of large woody debris available for the formation of persistent pool habitat in the long-term.

(4) Habitat Access

Fish passage and access to spawning and rearing habitat would remain unaffected or be improved under the proposed action. Proposed road construction would be located on or near ridge tops, away from fish-bearing portions of streams, and would not involve the construction of new stream crossings across fish-bearing streams.

(5) Essential Fish Habitat

As discussed in the under *Hydrology* and in preceding paragraphs under *Aquatic Habitat*, there would either be no effect or a negligible effect to the following components of EFH:

- Water quality/water quantity – refer to *Hydrology*: *Water Temperature*, *Water Quality*, and *Stream Flow (Water Yield & Peak Flow)*;
- Substrate characteristics – refer to *Substrate/sediment* above;
- Large woody debris with the channel and large woody debris source areas – refer to *Large Woody Debris* above;
- Channel geometry – refer to *Hydrology*: *Stream Flow (Water Yield & Peak Flow)*; and
- Fish passage – refer to *Habitat Access* above.

In addition, *forage species (aquatic and terrestrial invertebrates)* for fish would be unaffected as riparian vegetation within the "no-harvest" buffers would continue to provide organic material and terrestrial invertebrates which aquatic invertebrates use for food. Aquatic invertebrate populations would be unaffected by sediment since effects to aquatic habitat are negligible as presented in the preceding discussions.

Because the proposed action would not affect the components of EFH, the action would not adversely affect EFH for coho or Chinook salmon or critical habitat for coho salmon

in the Elk Creek Watershed. Without any mechanisms for an adverse effect to EFH, no mitigation measures are proposed.

2. Fish Populations

a) Affected Environment

(1) *Proposed Federally Threatened Species*

On February 4, 2008 NOAA Fisheries announced it is listing the Oregon coast coho salmon (*Oncorhynchus kisutch*) evolutionary significant unit (ESU) as threatened under the Endangered Species Act. This includes the designation of critical habitat.

(2) *Bureau Sensitive & Strategic Species*

Bureau Sensitive fish species and their habitats are managed by the BLM so as not to contribute to the need to list under the Endangered Species Act, and to recover the species (ROD/RMP, pg. 41). Bureau Sensitive fish species in the Elk Creek Watershed include the Oregon Coast steelhead (*Oncorhynchus mykiss*) and the Umpqua chub (*Oregonichthys kalawatseti*). Oregon Coast steelhead are present in the project area whereas the Umpqua chub has been documented in the watershed but not in the project area.

b) No Action Alternative

The smaller diameter in-stream woody debris (< 20 inches diameter) that would be derived from unthinned, riparian stands would create fish habitat (e.g. pool formation). But, habitat derived from small diameter woody debris would not persist in the stream as long as habitat derived from large woody debris (> 20 inches diameter). However, this difference would be undetectable within the range of natural variability and fish species and populations would remain unaffected.

c) Proposed Action Alternative

No effects to fish species, including the Oregon Coast coho salmon, adjacent to or below the project area would occur because the aquatic habitat would not be affected by the proposed action (*Aquatic Habitat*, pgs. 33-35). Sediment regime, stream temperature, water chemistry, peak flows, and water yield together influence fish habitat or aquatic species. Since stream temperature and water chemistry would not be affected by the proposed action and changes in sediment would be negligible (*Hydrology*, pgs. 30-31), fish habitat and aquatic species would not be affected.

Changes in peak flows and water yield from the project do not have the capacity to alter channel morphology (*Hydrology*, pgs. 31-32) and effects would be indistinguishable from background levels at the fish-bearing streams downstream. Therefore, fish habitat and aquatic species populations would not be incrementally affected by the proposed action at the project level nor would they add to the cumulative effects at the fifth-field watershed.

3. Aquatic Conservation Strategy

The BLM assessed the effect of the proposed project on the Aquatic Conservation Strategy (ACS) objectives at both the site and watershed scale (assessment included in Appendix C). The proposed project would not retard or prevent attainment of ACS objectives at the site or watershed scales. Instead, the proposed action would speed attainment of these objectives.

Therefore, this action is consistent with the ACS, and its objectives at the site and watershed scales.

G. Botany

1. Special Status Species

a) Affected Environment

(1) Federally Listed Species

The project is within the known range of Kincaid's Lupine (*Lupinus sulphureus* ssp. *kincaidii*), a Federally Threatened plant. Habitat for Kincaid's Lupine occurs in the project area. The project area is also within the known range of the Federally Endangered popcorn flower (*Plagiobothrys hirtus*); however, habitat for the popcorn flower is not present.

Field surveys were conducted in the spring and summer of 2008 to comply with Departmental Manual 6840 directives and the Special Status Plant program (ROD/RMP, pgs. 40-41). No Federally listed plant species were detected within the project area during these surveys (Appendix D).

(2) Bureau Sensitive & Strategic Species

Surveys conducted during the spring and summer of 2008 found two populations of the hairy sedge (*Carex gynodynama*), a Bureau Sensitive Species. One population is located near General Lee Unit 9A by a stream and the other is in General Lee Unit 9C near spur GL4 (Appendix E, Figure 5).

b) No Action Alternative

Hairy sedge populations would be expected to decline over time under the No Action Alternative due to shading by the conifers and competition with Himalayan blackberry. In addition, the population of hairy sedge in Unit 9A is also declining due to unauthorized cattle grazing. The Roseburg District Noxious Weed Program would continue to treat Himalyan blackberry and adjacent landowners have been contacted to address the unauthorized cattle grazing, so these factors contributing to the decline of the local hairy sedge populations would be reduced if not eliminated. However, declines in the hairy sedge populations would persist due to continued shading by conifers.

c) Proposed Action Alternative

The hairy sedge population near General Lee Unit 9A is located outside of the proposed unit boundaries and would not be directly affected by the proposed action. However, density management of conifers to the north of the population would benefit hairy sedges by increasing the light available at the site.

The hairy sedge population within General Lee Unit 9C could be impacted by Spur GL4 (i.e. physical crushing and disturbance through road construction) if the final spur location intersects the population. Crushing and disturbance to hairy sedge could be minimized, if the proposed location of Spur GL4 were moved a few feet to the north of the hairy sedge

population. This population would also benefit from conifer density management which would allow more sunlight to reach the hairy sedge plants.

As under the No Action Alternative, competition from Himalayan blackberry and impacts from unauthorized cattle grazing contributing to the decline of the local hairy sedge populations would be reduced if not eliminated. In addition, density management would benefit hairy sedge by opening the conifer canopy, thereby reducing the shading of the local populations.

2. Noxious Weeds

a) Affected Environment

Portions of the project area (i.e. within Township 22 S., Range 4 W.) are within the Cox Creek Weed Management Area for Portuguese broom (*Cytisus striatus*). Portuguese broom is an aggressive, invasive non-native species that is competitive with Douglas fir. Portuguese broom and Scotch broom both grow in this township and the two species readily hybridize. Both broom species and their hybrids are being treated in the Cox Creek Weed Management Area and as part of the ongoing Roseburg District Noxious Weed Program.

Other species of noxious weeds present on these sales include: Meadow knapweed (*Centaurea pratensis*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), common St. John's wort (*Hypericum perforatum*), English holly (*Ilex aquifolium*), evergreen blackberry (*Rubus laciniatus*), and tansy ragwort *(Senecio jacobea*). These species are not likely to establish invasive populations in forested habitats. Biocontrols, primarily insects that target specific noxious weed species, are present throughout the range of Scotch broom, meadow knapweed, Canada thistle, bull thistle, St. John's wort, and tansy ragwort.

Table 13. Noxious Weed Infestations.

Weed Species	Proposed Sale Area (acres)					
	Bear Bones	Bucko	Cox Pit	General Lee	Mr. Bennet	**Total**
English hawthorn	0.1	0.1	0.1	0	0.1	**0.4**
Scotch broom	1	1	54	5	3	**64**
Portuguese broom	0	0				
Himalayan blackberry	4	0.1	5	3	3	**15.1**
Total	**5.1**	**1.2**	**59.1**	**8**	**6.1**	**79.5**

b) No Action Alternative

Noxious weeds within the project area would continue to be managed as part of the Cox Creek Weed Management Area for Portuguese broom and under the Roseburg District's Noxious Weed Program. This area would be monitored for other weed populations and evaluated for treatment at regular intervals (USDI, 1995a). Under the Roseburg District Noxious Weed Program, control of weed populations within the project area is planned for treatment in 2009 by applying approved herbicides and/or manual removal.

Over time, the distribution and abundance of noxious weeds in the project area would decline. Repeated treatments of existing noxious weed populations, limited opportunities

(e.g. disturbed soil) for establishment of new infestations, and ongoing competition from native vegetation would reduce the noxious weed numbers in the project area.

c) Proposed Action Alternative

Existing infestations of Portuguese broom, Scotch broom, and Himalayan blackberry would be treated prior to density management operations in order to limit the development and spread of seeds. In addition, project design features (pg .14) would limit the spread of weed seed by washing logging and construction equipment prior to entry on BLM lands and also before leaving the Cox Pit, General Lee, and Mr. Bennet sale areas. As under the No Action Alternative, noxious weed populations would be monitored, evaluated, and treated under the Roseburg District's Noxious Weed Program.

Soil disturbance associated with density management (e.g. ground-based yarding, cable-yarding corridors, spur construction, and slash pile burning) would create areas of exposed mineral soil, which would serve as habitat for noxious weeds. New weed infestations on exposed mineral soil would be expected while there are openings in the canopy. As the conifer canopy closes, noxious weeds would decrease in abundance as native understory species eventually overtop and out-compete weeds for sunlight, soil moisture, and soil nutrients.

Chapter 4. Contacts, Consultations, and Preparers

A. Agencies, Organizations, and Persons Consulted

The Agency is required by law to consult with certain federal and state agencies (40 CFR 1502.25).

1. Threatened and Endangered (T&E) Species Section 7 Consultation

The Endangered Species Act of 1973 (ESA) requires consultation to ensure that any action that an Agency authorizes, funds or carries out is not likely to jeopardize the existence of any listed species or destroy or adversely modify critical habitat.

a) U.S. Fish & Wildlife Service

Consultation with the U.S. Fish & Wildlife Service is in process for the northern spotted owl for *Actions Proposed by the Roseburg District BLM for Fiscal Years 2009-2010*. When consultation has been completed, the results will be disclosed in the project specific decision document and Finding of No Significant Information (FONSI).

b) NOAA Fisheries Service

The Swiftwater fisheries staff has determined that this project would have no mechanism for an effect on Oregon Coast coho salmon. The proposed action, and its interrelated and interdependent actions, would have no direct effects on Oregon Coast coho salmon and would not destroy or adversely modify its designated critical habitat. In addition, project design features would ensure that no indirect effects to Oregon Coast coho salmon or their habitat would occur. Therefore, the proposed project would not have an effect on Oregon Coast coho salmon or its habitat and further consultation with the NOAA Fisheries Service is not required.

2. Cultural Resources Section 106 Compliance

Compliance with Section 106 of the National Historic Preservation Act under the guidance of the 1997 National Programmatic Agreement and the 1998 Oregon Protocol has been documented with Project Tracking Forms dated October 17, 2008. It was determined that there would be no effect to any cultural or historical resources since none would be included within the Northeast Elk harvest units.

B. Public Notification

1. Scoping Letter

A scoping letter was sent (September 5, 2008) to 55 **adjacent landowners**, **landowners along the proposed haul route**, **registered water-rights users**, **tribal governments** (Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, Cow Creek Band of Umpqua Tribe of Indians, and the Komemma Cultural Protection Association), and interested members of the **general public**. Comments were accepted until September 30, 2008 and three comments were received. Comments received typically concerned the general design of the proposed project. The comments were considered in the design of the proposed project.

2. Roseburg District Planning Updates

The **general public** was notified via the *Roseburg District Planning Updates* (i.e. Fall 2008)

which was published on the Roseburg District BLM Internet website. Electronic notification of the availability of the Roseburg District Planning was sent to approximately 40 addressees. These addressees consist of members of the public that have expressed interest in Roseburg District BLM projects.

3. State, County, and Local Government Agencies

This EA, and its associated documents, would be provided to certain **State, County and local government** offices including: U.S. Fish & Wildlife Service, NOAA Fisheries Service, Oregon Department of Environmental Quality, and the Oregon Department of Fish and Wildlife. If the decision is made to implement this project, it will be sent to the aforementioned State, County, and local government offices.

4. Public Comment Period

A 30-day **public comment period** would be established for review of this EA. A Notice of Availability would be published in *The News-Review*. The public comment period will begin with publication of the notice published in *The News-Review* on December 2, 2008 and end close of business January 2, 2009. Comments must be received during this period to be considered for the subsequent decision. If the decision is made to implement this project, a notice will be published in *The News-Review* and notification sent to all parties who request them.

C. List of Preparers

Core Team

Project Lead	Paul Meinke
Management Rep.	Al James
Botany/Noxious Weeds	Julie Knurowski
Engineering	Terrie King
Fisheries	Jeff McEnroe
Fuels Management	Krisann Kosel
Hydrology	Brooke Shakespeare
Hydrology	Dan Dammann
Layout	Brad Talbot (Bucko, General Lee)
Layout	Bruce Baumann
Layout	Cary Swain (Bear Bones, Cox Pit)
Layout	Casey Steenhoven (Mr. Bennet)
NEPA Writer/Editor	Rex McGraw
Silviculture	Trixy Moser
Soils	Dan Cressy
Timber Cruising	Joe Keady
Wildlife	Elizabeth Gayner

Expanded Team (Consulted)

Isaac Barner	Cultural Resources
Erik Taylor	Recreation / Visual Resource Management

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Appendix A. Bureau Sensitive & Bureau Strategic Wildlife Species

Project: Northeast Elk Density Management
Prepared By: Elizabeth Gayner
Date: September24, 2008
SSSP List Date: July 26, 2007 (IM-OR-2007-072)

The following tables include those species which are documented or suspected to occur within the Roseburg District BLM. Those Bureau Sensitive or Bureau Strategic species which are suspected or documented to occur within the project area are detailed in below and may be further discussed in the body of the EA as appropriate.

Bureau Sensitive Species. BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species. To comply with Bureau policy, Districts may use one or more of the following techniques:

a. Evaluation of species-habitat associations and presence of potential habitat.
b. Application of conservation strategies, plans, and other formalized conservation mechanisms.
c. Review of existing survey records, inventories, and spatial data.
d. Utilization of professional research and literature and other technology transfer methods.
e. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
f. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to: modifying a project (e.g. timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Strategic Species. If sites are located, collect occurrence data and record in corporate database.

Table A-1. Bureau Sensitive & Strategic Wildlife Species.

Species	Status[1]	Present in Project Area?	General Habitat Requirements
BUREAU SENSITIVE			
American Peregrine Falcon *Falco peregrinus anatum*	BS, SE	No Habitat	Cliffs, rock outcrops; open habitats for hunting birds
Bald Eagle *Haleaeetus leucocephalus*	BS, ST	No Known Nest/ Roost Sites	Late successional forests with multi-canopies, generally within two miles of a major water source
Chace Sideband *Monadenia chaceana*	BSO	Out of Range	Rocky, talus habitats in the Klamath Province and southwards
Columbian White Tailed Deer *Odocoileus virginianus leucurus*	BSO, CR	No Habitat	Bottomlands, oak/hardwood forests; cover for fawning
Crater Lake Tightcoil *Pristiloma arcticum crateris*	BSO	Suspected	Perennially wet areas in late seral forests above 2000ft elevation and east of Interstate-5; seeps, springs, riparian areas
Fisher *Martes pennanti*	BS	Suspected	Structurally complex forests; mature open forests with large live trees, snags, and down wood.
Foothill Yellow-legged Frog *Rana boylii*	BSO, V	No Habitat	Low gradient streams/ponds; gravel/cobble, bedrock pools
Fringed Myotis *Myotis thysanodes*	BSO, V	Suspected	Late-successional forest features (e.g. snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, bridges, rock crevices

Species	Status[1]	Present in Project Area?	General Habitat Requirements
Green Sideband *Monadenia fidelis beryllica*	BSO	Out of Range	Coast Range, riparian forests at low elevations; deciduous trees & shrubs in wet, undisturbed forest
Harlequin Duck *Histrionicus histrionicus*	BS, U	No Habitat	Mountain Streams in forested areas on west slope of the Cascade Mountains
Lewis' Woodpecker *Melanerpes lewis*	BSO, CR	No Habitat	Open woodland habitat near water; open woodland canopy and large diameter dead/dying trees, snag cavities
Northwestern Pond Turtle *Clemmys marmorata marmorata*	BS, CR	No Habitat	Ponds, low gradient rivers; upland over-wintering habitat, CWD
Oregon Shoulderband *Helminthoglypta hertleini*	BSO	No Habitat	Talus and rocky substrates, grasslands or other open areas with low-lying vegetation
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	BS, CR	No Habitat	Open habitats such as grasslands, meadows, farmlands
Pallid Bat *Antrozous pallidus*	BS, V	No Habitat	Usually rocky outcroppings near open, dry open areas; occasionally near evergreen forests
Purple Martin *Progne subis*	BSO, CR	Suspected	Snags cavities in open habitats (e.g. grasslands, brushlands, open woodlands)
Rotund Lanx *Lanx subrotundata*	BSO	No Habitat	Major rivers and large tributaries with cold, well-aerated water and rocky substrate
Scott's Apatanian Caddisfly *Allomyia scotti*	BSO	Out of Range	High-elevation (>4,000ft), cold streams in the mountainous regions of Oregon
Spotted Tail-dropper *Prophysaon vannattae pardalis*	BSO	Out of Range	Mature conifer forests in the Coast Range; associated with significant deciduous tree/shrub component
Townsend's Big-eared Bat *Corynorhinus townsendii*	BS, CR	Suspected	Late-successional forest features (e.g. snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, buildings, bridges, tunnels
Western Ridgemussel *Gonidea angulata*	BS	No Habitat	Creeks, rivers, coarse substrates; Umpqua R. and possibly major tribs.
White-Tailed Kite *Elanus leucurus*	BS	No Habitat	Open grasslands, meadows, emergent wetlands, farmlands, lightly, wooded areas; wooded riparian habitats close to open hunting; tall trees and shrubs
BUREAU STRATEGIC			
Broadwhorl Tightcoil *Pristiloma johnsoni*	Strategic	Out of Range	Moist forest sites, typically with deciduous component; Coast/Cascades in WA, Coast Range in OR, as far south as Lane County
Klamath Tail-Dropper *Prophysaon sp. nov.*	Strategic	Out of Range	Moist, open areas along streams or springs in Ponderosa Pine forests; as far North as Crater Lake
Merlin *Falco columbarius*	Strategic	Suspected	Coniferous forests adjacent to open habitats, along forest edges.
Pristine Springsnail *Pristinicola hemphilli*	Strategic	Out of Range	Shallow, cold, clear springs/seeps; strongly spring-influenced streams, slow-moderate flow; Umpqua R. drainage
Oregon Giant Earthworm *Driloleirus macelfreshi*	Strategic	Suspected	Deep, moist, undisturbed soils of riparian forests.

[1] Status abbreviations: FE--Federal Endangered, FT--Federal Threatened, SE--State Endangered, ST--State Threatened, XC--Former Federal Candidate, CR--ODFW Critical, V--ODFW Vulnerable, P--ODFW Peripheral/Naturally Rare, U--ODFW Undetermined, BS-- Bureau Sensitive in Oregon and Washington, BSO-- Bureau Sensitive in Oregon.

Appendix B. Soils

Project: Northeast Elk Density Management
Prepared By: Dan Cressy
Date: September 26, 2008

Table B-1. Timber Production Capability Classification (TPCC).

Unit	FGR[1] (acres)	FPR[2] (acres)	FSR[3] (acres)	FGNW[4] (acres)	FPNW[5] (acres)	Category 1[6] (acres)
Bear Bones 27A	2		NA	0	0	NA
Bear Bones 27B	2	0	NA	0	0	NA
Bear Bones Sub-Total	4	0	NA	0	0	NA
Bucko 35A	4	1	NA	1	0	NA
Bucko Sub-Total	4	1	NA	1	0	NA
Cox Pit 20A	0	0	NA	0	0	NA
Cox Pit 21A	1	0	NA	0	0	NA
Cox Pit 21B	0	0	NA	0	0	NA
Cox Pit 21C	1	0	NA	0	0	NA
Cox Pit 21D	3	1	NA	0	0	NA
Cox Pit Sub-Total	5	1	NA	0	0	NA
General Lee 9A	0	0	NA	0	0	NA
General Lee 9B	10	0	NA	0	0	NA
General Lee 9C	3	0	NA	0	0	NA
General Lee 15A	3	0	NA	0	0	NA
General Lee Sub-Total	16	0	NA	0	0	NA
Mr. Bennet 23A	3	1	NA	0	0	NA
Mr. Bennet 23B	1	0	NA	0	0	NA
Mr. Bennet 27A	8	1	NA	0	1	NA
Mr. Bennet 3A	2	0	NA	0	0	NA
Mr. Bennet Sub-Total	14	2	NA	0	1	NA
Grand Total	**43**	**4**	**NA**	**1**	**1**	**NA**

[1] **FGR** = fragile soils that are subject to unacceptable soil and organic matter losses from surface erosion or mass soil movements as a result of forest management activities, unless mitigating measures (BMPs) are used to protect the soil.
[2] **FPR** = fragile soils that may contain tension cracks and/or sag ponds; because of the slow rate of movement, forest management is feasible.
[3] **FSR** = fragile soils that typically have loamy fine sands and sandy loam textures with high amounts of coarse fragments (i.e. rock); they generally have between one and ½ inch of available water holding capacity in the top 12 inches (i.e. water deficiency).
[4] **FGNW** = fragile soils where unacceptable soil and organic matter losses could occur from surface erosion or mass soil movements as a result of forest management activities; these losses cannot be mitigated even using best management practices.
[5] **FPNW** = fragile soils that have active, deep-seated slump-earthflow types of mass movement; because of the rapid rate of movement, forest management is not feasible on these sites.
[6] **Category 1** = soils that are highly sensitive to broadcast burning due to shallow soil depths, that have A horizons less than 4 inches in depth, and/or that are on slopes over 70 percent.

Table B-2. Mass Wasting & Landslides in the Action Area. An analysis of mass wasting events initiating inside the proposed thinning unit was done using aerial photo interpretation covering 1960 to 2004 and field reconnaissance. Documented are landslides that occurred after clear cut harvest.

Sale Name	# Debris Torrents	# Landslides[1]			
	Large (>0.5 acre)	Small (< 0.1 acre)	Medium (0.1-0.5 acre)	Large (> 0.5 acre)	All
Bear Bones	0	0	0	0	0
Bucko	0	3	1	0	4 (0.40 acres)
Cox Pit	0	7	0	0	7 (0.40 acres)
General Lee	0	9	3	0	12 (1.04 acres)
Mr. Bennet	0	6	4	0	10 (0.90 acres)
Total	0	25	8	0	33 (2.74 acres)
Probability of occurrence expected within units:					
No Action Alternative	none	low	low	low	low
Action Alternative (Treatment)	low	low-mod	low-mod	low	low
Cumulative Effects	Unchanged[2]	Unchanged[2]	Unchanged[2]	Unchanged[2]	Unchanged[2]

[1] Six of the identified landslides were road-related and 27 were harvest-related.

[2] "Unchanged" indicates that the current conditions and current probabilities of mass wasting or landslide events are expected to be essentially the same at the 6th field watershed scale.

Appendix C. Aquatic Conservation Strategy Assessment

Project: Northeast Elk Density Management
Prepared By: Brooke Shakespeare and Jeff McEnroe
Date: August 27, 2008

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, page B-9).

ACS Components:

(1) Riparian Reserves (ACS Component #1)

Riparian Reserves were established. The ROD/RMP (pg. 24) specifies Riparian Reserve widths equal to the height of two site potential trees on each side of fish-bearing streams and one site-potential tree on each side of perennial or intermittent non-fish bearing streams, wetlands greater than an acre, and constructed ponds and reservoirs. The height of a site-potential tree for the Elk Creek Watershed has been determined to be the equivalent of 200 feet (Elk Creek Watershed Analysis, pg. 2). Approximately 674 acres of this treatment are within Riparian Reserves. One of the objectives of this project is to accelerate the development of late seral characteristics in the Riparian Reserves.

(2) Key Watersheds (ACS Component #2)

Key Watersheds were established "as refugia . . . for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species [ROD/RMP, pg. 20]." There are no key watersheds within the Elk Creek fifth-field watershed.

(3) Watershed Analysis (ACS Component #3) and other pertinent information:

In developing the project, the Elk Creek Watershed Analysis was used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate alternatives. Existing watershed conditions are described in the *Hydrology* and *Aquatic Habitat & Fisheries* sections of the EA and also in the Elk Creek Watershed Analysis. The short and long term effects to aquatic resources are also described in these sections of the EA.

(4) Watershed Restoration (ACS Component #4)

One of the purposes of this project is to accelerate tree growth in Riparian Reserves and the attainment of late seral stand conditions. Therefore, the Riparian Reserve portions of the proposed action are considered to be a watershed restoration project.

Additionally, since 1994, numerous stream enhancement projects have been implemented in the Elk Creek Watershed. This includes placing instream structures (e.g. logs, boulders, root wads, etc…) to improve aquatic habitat on over four miles of stream, replacing over 13 culverts identified as barriers to fish passage to open up access to additional habitat, or improving or decommissioning over ten miles of road to reduce road sediment impacts to aquatic systems. This work has been done in collaboration with private timber companies, the Partnership for Umpqua Rivers watershed council, Oregon Department of Fish and Wildlife, and the BLM.

Future opportunities for restoration are discussed in the Elk Creek/Umpqua River Watershed Analysis. Approximately 52 miles of road were identified for improvement or decommissioning, 55 miles of stream for instream restoration and 31 culverts for replacement. This work would be implemented as budgets allow.

Range of Natural Variability within the Watershed:

Based on the dynamic, disturbance-based nature of aquatic systems in the Pacific Northwest, the range of natural variability at the site scale would range from 0-100 percent of potential for any given aquatic habitat parameter over time. Therefore, a more meaningful measure of natural variability is assessed at scales equal to or greater than the fifth-field watershed scale. At this scale, spatial and temporal trends in aquatic habitat condition can be observed and evaluated over larger areas, and important cause/effect relationships can be more accurately determined.

Natural disturbance events to aquatic systems in the Pacific Northwest include wildfires, floods, and landslides. Average fire return intervals at the drainage scale were calculated between 50 and 75 years (prior to the advent of fire suppression). The more destructive stand replacement fires occurred irregularly at intervals from 150 to 350 years (Elk Creek Watershed Analysis, pg. 9). Most of the Elk Creek watershed is dominated by Tyee and Umpqua Formations of sandstones and siltstones which have a relatively high frequency of debris avalanches on slopes steeper than 65 percent and debris flows on slopes steeper than 35 percent.

Timber harvesting and road construction over the past 50 years have substantially increased the frequency and distribution of landslides above natural levels in the Elk Creek Watershed. However, there is a downward trend in landslide incidence over the last 50 years that is associated with improved management practices. (Elk Creek Watershed Analysis, pgs. 35-36) On BLM land, future landslides, mostly during large storm events, are expected to deliver large wood and rock fragments to lower-gradient streams because of BLM Riparian Reserves. These events would more closely resemble landslides within relatively unmanaged forests. These disturbance events are the major natural sources of sediment and wood to a stream system and are very episodic in nature.

Due to the dynamic nature of these disturbance events, stream channel conditions vary based on the time since the last disturbance event. This results in a wide range of aquatic habitat conditions at the site level. Site level habitat conditions can be summarized by Oregon Department of Fish and Wildlife (ODFW) habitat surveys. Surveys have been conducted throughout Elk Creek mostly in the third through sixth-order streams. Approximately 20 stream reference reaches in the Coast Range of the Umpqua Basin were used to compare against all surveyed streams. These relatively unmanaged reaches represent the variability of conditions within natural stream systems as well as characteristics desirable for a variety of fish species (including salmonid habitat). When compared to these "reference streams", aquatic habitat survey data from the Elk Creek watershed indicates that most of the tributaries are lacking large woody debris. While this condition is considered typical at any given site scale, it is considered atypical for most streams to be devoid of wood at the larger fifth-field scale. Therefore, at this larger scale, aquatic habitat conditions are considered to be outside the range of natural variability.

Because of its dynamic nature, sediment effects to streams can only be described in general terms. It is important to remember that ODFW instream habitat data is a snapshot in time. When compared to reference reaches, sediment conditions in most of the tributaries of Elk Creek Watershed appear to be similar to the reference reaches (Elk Creek Watershed Analysis).

Stream temperatures vary naturally in this watershed as a result of variation in geographic location, elevation, climate, precipitation, and distance from the source water (Elk Creek Watershed Analysis, pgs. 43-44). Stream temperatures also naturally vary as a response to the natural disturbance events mentioned

in the previous paragraphs, as well as current practices on private forest, agricultural, and residential properties. Due to the large amount of riparian clearing that has occurred over the last 150 years (converting forest into farmland), coupled with management-induced channel widening, irrigation withdrawals, and loss of gravels, it is likely that stream temperature increases have been greater over larger spatial and temporal scales than observed naturally. One of BLM's objectives for managing Riparian Reserves is to maintain and enhance shade providing vegetation along streams.

Changes in stream flow can result from consumptive withdrawals and effects of land use activities on storm water runoff, infiltration, storage and delivery. Commercial and domestic withdrawals are common along Elk Creek. There is evidence that previous management has heavily influenced stream channels throughout the Elk Creek Watershed (Elk Creek Watershed Analysis, pg 44). Over the last 150 years, much of the lower elevation forest land has been converted to farmland. Many tributaries within Elk Creek have also been cleaned (had large wood removed) or salvage logged. BLM Forest management in Elk Creek would be designed to reduce or prevent watershed impacts.

Table C-1. Individual Aquatic Conservation Strategy Objective Assessment.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
	Scale Description: Units identified in this project are located in seven separate seventh-field drainages (detailed below*) distributed throughout the watershed totaling roughly 21,947 acres in size. The BLM manages approximately 4,730 acres in these drainages (22%). Units proposed for treatment represent 7% of the total drainage area, and 35% of the BLM-managed lands in the drainage.	Scale Description: This project is located in the Elk Creek/Umpqua River fifth-field watershed. This watershed is roughly 187,000 acres in size. The BLM manages approximately 45,000 acres in this watershed (24%). Units proposed for treatment represent 1% of the total watershed area, and 4% of the BLM-managed lands in the watershed. Approximately 4 acres of proposed timber harvest fall in the Upper Coast Fork Willamette River fifth-field watershed. Thinning 4 acres of the 97,464 acre Upper Coast Fork Willamette River Watershed (0.004%) would result in no measurable change to any watershed parameter. Therefore, effects to the Upper Coast Fork Willamette River Watershed will not be discussed further
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.	Within the drainage, the proposed action would result in approximately 674 acres of thinned riparian stands. Trees within these treated stands would attain larger heights and diameters in a shorter amount of time than if left untreated. PDF's such as variable width "no-harvest" buffers established along continuous streams would retain shading and therefore maintain water temperature. "No-harvest" buffers established on	This treatment would also speed attainment of this objective at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
	continuous streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways (refer to *Hydrology*: *Water Quality*; pgs. 30-31) and would prevent impacts to aquatic resources. This treatment would speed attainment of this objective.	
2. Maintain and restore spatial and temporal connectivity within and between watersheds	Within the drainage, the proposed project would have no influence on aquatic connectivity. Therefore this treatment would maintain the existing connectivity condition at the site scale.	Within the watershed, the proposed project would have no influence on aquatic connectivity. Therefore this treatment would maintain the existing connectivity condition at the watershed scale.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations	Treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (refer to *Hydrology*: *Stream Flow*; pgs. 31-32). In addition, "no-harvest" buffers established on all continuous streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks (refer to *Project Design Features*, pg. 5). Therefore, these treatments would maintain the physical integrity of the aquatic system at the site scale.	This treatment would also maintain the physical integrity of the aquatic system at the watershed scale.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	Project design features (PDF) would ensure that water quality would not be adversely impacted by the proposed action. PDF's such as variable width "no-harvest" buffers established along continuous streams would retain shading and hence maintain water temperature. "No-harvest" buffers established on continuous streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways (refer to *Hydrology*: *Water Quality*; pgs. 30-31). Therefore, this treatment would maintain the existing water quality at the site scale.	Based on the information discussed at the site scale, this project would also maintain water quality at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	As mentioned above, "No-harvest" buffers established on continuous streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing any management related sediment transported by overland flow to settle out before reaching active waterways (refer to *Hydrology*: *Water Quality*; pgs. 30-31). Therefore, this project would maintain the existing sediment regime.	This project would maintain the existing sediment regime at the watershed scale as well.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.	Treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (refer to *Hydrology*: *Stream Flow*; pgs. 31-32). The project would involve partial removal of vegetation on areas constituting ten percent or less of each affected sub-watershed. In addition, new road construction would not noticeably extend the drainage network or contribute to a potential increase in peak flow because the new roads would be located on ridge tops or stable side slopes with adequate cross drain structures preventing channel extension on roads that do cross streams. Therefore, this treatment would maintain stream flows within the range of natural variability at the site scale.	As discussed at the site scale, density management treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows. Therefore, at the larger watershed scale, this treatment would also maintain stream flows within the range of natural variability.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and woodlands.	As discussed in #6 above, this project would maintain stream flows within the range of natural variability at the site scale. Therefore, it would also maintain stream interactions with the floodplain and respective water tables at the site scale.	At the watershed scale, this project would also maintain stream interactions with the floodplain and respective water tables within the range of natural variability.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of	The proposed treatment is designed to return riparian stands to a more natural density and growth trajectory. Therefore this treatment would serve to restore plant species composition and structural diversity at the site scale.	The proposed treatment is designed to return riparian stands to a more natural density and growth trajectory. Therefore this treatment would serve to restore plant species composition and structural diversity at the larger watershed scale as well.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.		
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	As mentioned previously, one of the objectives of this project is to restore riparian stand conditions in the proposed treatment areas. Implementation of riparian restoration projects will help restore adequate habitat to support riparian-dependent species at the site and watershed scales.	As mentioned previously, one of the objectives of this project is to restore riparian stand conditions in the proposed treatment areas. Implementation of riparian restoration projects will help restore adequate habitat to support riparian-dependent species at the site and watershed scales.

*Detailed scale description of the seven seventh-field drainages: Bear Creek-Pass Creek, Buck Creek-Pass Creek, Upper Thief Creek, Lees Creek, Curtis Creek, Cox Creek, and Scotts Valley.

1) The **Bear Creek-Pass Creek** drainage is roughly 3,480 acres in size. The BLM manages approximately 760 acres in this drainage (22%). Units proposed for treatment represent 11% of the total drainage area, and 51% of the BLM-managed lands in the drainage.
2) The **Buck Creek-Pass Creek** drainage is roughly 3,290 acres in size. The BLM manages approximately 660 acres in this drainage (20%). Units proposed for treatment represent 6% of the total drainage area, and 32% of the BLM-managed lands in the drainage.
3) The **Upper Thief Creek** drainage is roughly 2,150 acres in size. The BLM manages approximately 311 acres in this drainage (14%). Units proposed for treatment represent 2% of the total drainage area, and 13% of the BLM-managed lands in the drainage.
4) The **Lees Creek** drainage is roughly 2,150 acres in size. The BLM manages approximately 860 acres in this drainage (40%). Units proposed for treatment represent 10% of the total drainage area, and 25% of the BLM-managed lands in the drainage.
5) The **Curtis Creek** drainage is roughly 2,300 acres in size. The BLM manages approximately 770 acres in this drainage (33%). Units proposed for treatment represent 10% of the total drainage area, and 31% of the BLM-managed lands in the drainage.
6) The **Cox Creek** drainage is roughly 3,450 acres in size. The BLM manages approximately 1050 acres in this drainage (30%). Units proposed for treatment represent 13% of the total drainage area, and 42% of the BLM-managed lands in the drainage.
7) The **Scotts Valley** drainage is roughly 5,130 acres in size. The BLM manages approximately 310 acres in this drainage (6%). Units proposed for treatment represent 2% of the total drainage area, and 28% of the BLM-managed lands in the drainage.

ACS Summary:

Based upon the information listed above, the proposed action would meet ACS objectives at the site and watershed scale. In addition, based upon the restorative nature of the action, this project would not retard or prevent attainment of ACS objectives; it would actually speed attainment of these objectives. Therefore, this action is consistent with the ACS and its objectives at both the site and watershed scales.

Appendix D. Botany Summary

Project: Northeast Elk Density Management
Prepared By: Julie Knurowski
Date: September 30, 2008
SSSP List Date: February 8, 2008 (IM-OR-2008-038)

Those Bureau Sensitive or Bureau Strategic species which are suspected or documented to occur within the Roseburg District BLM area are detailed below in Tables D-1 and D-2 and may be further discussed in the body of the EA as appropriate.

Bureau Sensitive Species. BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species. To comply with Bureau policy, Districts may use one or more of the following techniques:

a. Evaluation of species-habitat associations and presence of potential habitat.
b. Application of conservation strategies, plans, and other formalized conservation mechanisms.
c. Review of existing survey records, inventories, and spatial data.
d. Utilization of professional research and literature and other technology transfer methods.
e. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
f. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to: modifying a project (e.g. timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Strategic Species. If sites are located, collect occurrence data and record in the corporate database.

Table D-1. Federally Listed & Bureau Sensitive Botanical Species.

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Threatened & Endangered Species						
Lupinus sulphureus ssp. *kincaidii* Kincaid's lupine (T)	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug. 2008	N/A
Plagiobothrys hirtus Rough popcorn flower (E)	**Yes**	No	No	No habitat present.	N/A	N/A
Sensitive Species						
Chiloscyphus gemmiparus Liverwort	**Yes**	No	No	No habitat present.	N/A	N/A
Diplophyllum plicatum Liverwort	**Yes**	No	No	No habitat present	N/A	N/A
Entosthodon fascicularis Moss	**Yes**	No	No	No habitat present	N/A	N/A
Gymnomitrion concinnatum Liverwort	**Yes**	No	No	No habitat present.	N/A	N/A
Helodium blandowii Moss	**Yes**	No	No	No habitat present	N/A	N/A
Meesia uliginosa Moss	**Yes**	No	No	No habitat present	N/A	N/A
Schistostega pennata Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tayloria serrata Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tetraphis geniculata	**Yes**	No	No	No habitat present	N/A	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Moss						
Tetraplodon mnioides Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tomentypnum nitens Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tortula mucronifolia Moss	**Yes**	No	No	No habitat present	N/A	N/A
Trematodon boasii Moss	**Yes**	No	No	No habitat present.	N/A	N/A
Bridgeoporus nobilissimus Giant polypore fungus	No	No	N/A	No habitat present.	N/A	N/A
Cudonia monticola *Fungi*	Yes	No	N/A	Surveys Not Practical. [1]	N/A	N/A
Dermocybe humboldtensis Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Gomphus kauffmanii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Helvella crassitunicata Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Leucogaster citrinus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Otidea smithii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia californica Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia dissiliens Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia gregaria Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia olivacea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia oregonensis Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia pseudofestiva Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia scatesiae Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia sipei Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia spacidea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Pseudorhizina californica Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria amyloidea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria gelatiniaurantia Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria largentii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria spinulosa var. *diminutiva* Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Rhizopogon chamalelotinus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Rhizopogon exiguus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Sowerbyella rhenana Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Bryoria subcana Lichen	**No**	No	N/A	No habitat present.	N/A	N/A
Calicium adspersum Lichen	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug 2008	N/A
Chaenotheca subroscida Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Dermatocarpon meiophyllizum Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Hypogymnia duplicata Lichen	**No**	No	N/A	No habitat present.	N/A	N/A
Leptogium cyanescens Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lobaria linita Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Pannaria rubiginosa Lichen	**No**	No	N/A	No habitat present.	N/A	N/A
Pilophorus nigricaulis Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Stereocaulon spathuliferum Lichen	**Yes**	No	N/A	No habitat present.	N/A	N/A
Adiantum jordanii California maiden-hair	**Yes**	No	N/A	No habitat present.	N/A	N/A
Arabis koehleri var. *koehleri* Koehler's rockcress	**Yes**	No	N/A	No habitat present.	N/A	N/A
Arctostaphylos hispidula *Hairy manzanita*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Asplenium septentrionale Grass-fern	**Yes**	No	N/A	No habitat present.	N/A	N/A
Bensoniella oregana Bensonia	**Yes**	No	N/A	No habitat present.	N/A	N/A
Botrychium minganense Gray moonwort	**Yes**	No	N/A	No habitat present.	N/A	N/A
Calochortus coxii Crinite mariposa-lily	**Yes**	No	N/A	No habitat present.	N/A	N/A
Calochortus umpquaensis Umpqua mariposa-lily	**Yes**	No	N/A	No habitat present.	N/A	N/A
Camassia howellii Howell’s camas	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex brevicaulis Short stemmed sedge	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex comosa Bristly sedge	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex gynodynama Hairy sedge	**Yes**	**Yes**	**Yes**	2 populations in project area.	Aug 2008	N/A
Carex serratodens Saw-tooth sedge	**Yes**	No	No	No habitat present.	N/A	N/A
Cicendia quadrangularis Timwort	**Yes**	No	N/A	No habitat present	N/A	N/A
Cimicifuga elata var. elata Tall bugbane1	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug 2008	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Cypripedium fasciculatum Clustered lady slipper	**Yes**	**Yes**	No	No habitat present.	N/A	N/A
Delphinium nudicaule Red larkspur	**Yes**	**Yes**	No	No habitat present.	N/A	**N/A**
Epilobium oreganum Oregon willow-herb	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug 2008	**N/A**
Eschscholzia caespitosa Gold poppy	**Yes**	No	No	No habitat present.	N/A	**N/A**
Eucephalus vialis Wayside aster	**Yes**	**Yes**	No	Surveys performed, not detected.	N/A	**N/A**
Horkelia congesta ssp. *congesta* Shaggy horkelia	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug 2008	**N/A**
Horkelia tridentata ssp. *tridentate* Three-toothed horkelia	**Yes**	**Yes**	No	Surveys performed, not detected.	Aug 2008	N/A
Iliamna latibracteata California globe-mallow	**Yes**	No	N/A	No habitat present.	N/A	N/A
Kalmiopsis fragrans Fragrant kalmiopsis	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lathyrus holochlorus Thin-leaved peavine	**Yes**	No	N/A	Surveys performed, not detected.	N/A	N/A
Lewisia leana Lee's lewisia	**Yes**	No	N/A	No habitat present.	N/A	N/A
Limnanthes gracilis var. *gracilis* Slender meadow-foam	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lotus stipularis *Stipuled trefoil*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Meconella oregana *White fairypoppy*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Pellaea andromedifolia Coffee fern	**Yes**	No	No	No habitat present	N/A	N/A
Perideridia erythrorhiza Red-rooted yampah	**Yes**	No	N/A	No habitat present.	N/A	N/A
Polystichum californicum California sword-fern	**Yes**	No	N/A	No habitat present.	N/A	N/A
Romanzoffia thompsonii *Thompson's mistmaiden*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Schoenoplectus subterminalis Water clubrush	**Yes**	No	N/A	No habitat present.	N/A	N/A
Scirpus pendulus *Drooping rush*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Sisyrinchium hitchcockii Hitchcock's blue-eyed grass	**Yes**	No	N/A	No habitat present.	N/A	N/A
Utricularia gibba Humped bladderwort	**Yes**	No	N/A	No habitat present	N/A	N/A
Utricularia minor Lesser bladderwort	**Yes**	No	N/A	No habitat present.	N/A	N/A
Wolffia borealis Dotted water-meal	**Yes**	No	N/A	No habitat present.	N/A	N/A
Wolffia columbiana Columbia water-meal	**Yes**	No	N/A	No habitat present.	N/A	N/A

[1] Surveys are considered not practical for these species based on the 2003 Annual Species Review (IM-OR-2004-034).

Table D-2. Bureau Strategic Botanical Species.

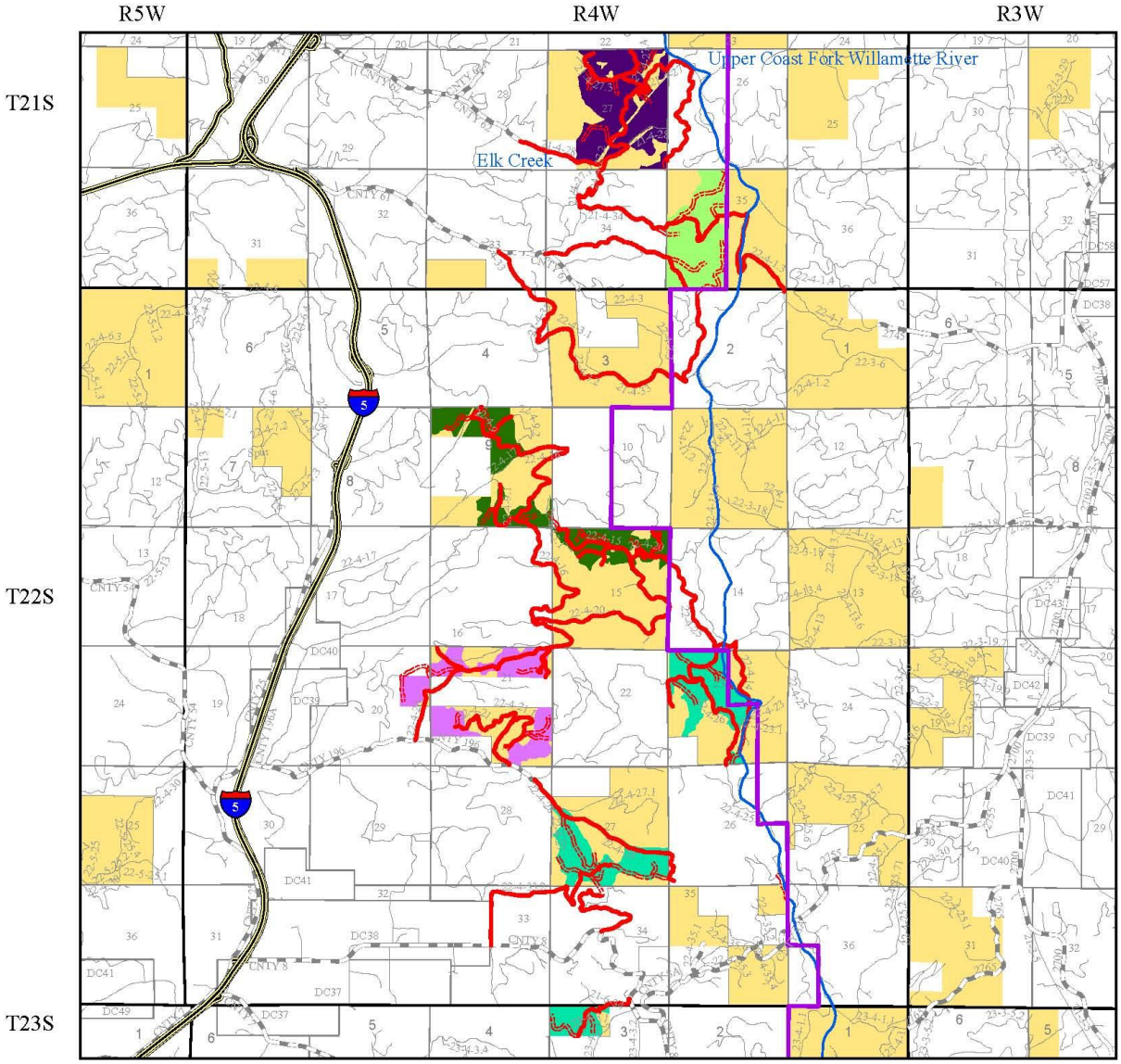
Scientific Name	Roseburg Occurrence?	Occurrence in the Project Area?
Bryophytes		
Cephaloziella spinigera	Suspected	None Observed
Grimmia anomala	Suspected	None Observed
Scouleria marginata	Suspected	None Observed
Fungi		
Cazia flexiascus	Suspected	Surveys Not Practical. 1
Choiromyces alveolatus	Suspected	Surveys Not Practical. 1
Clavariadelphus subfastigiatus	Documented	Surveys Not Practical. 1
Endgame oregonensis	Documented	Surveys Not Practical. 1
Blomus pubescens	Suspected	Surveys Not Practical. 1
Gymnomyces monosporus	Documented	Surveys Not Practical. 1
Helvella elastica	Documented	Surveys Not Practical. 1
Hygrophorus albicarneus	Suspected	Surveys Not Practical. 1
Mycena quinaultensis	Suspected	Surveys Not Practical. 1
Nolanea verna var. *isodiametrica*	Suspected	Surveys Not Practical. 1
Plectania milleri	Suspected	Surveys Not Practical. 1
Psathyrella quercicola	Suspected	Surveys Not Practical. 1
Ramaria abietina	Documented	Surveys Not Practical. 1
Ramaria bothryis var. aurantiiramosa	Suspected	Surveys Not Practical. 1
Ramaria concolor f. tsugina	Suspected	Surveys Not Practical. 1
Ramaria conjunctipes var. sparsiramosa	Suspected	Surveys Not Practical. 1
Ramaria coulterae	Suspected	Surveys Not Practical. 1
Ramaria rubribrunnescens	Suspected	Surveys Not Practical. 1
Ramaria suecica	Documented	Surveys Not Practical. 1
Ramaria thiersii	Suspected	Surveys Not Practical. 1
Rhizopogon brunneiniger	Suspected	Surveys Not Practical. 1
Rhizopogon clavitisporus	Suspected	Surveys Not Practical. 1
Rhizopogon flavofibrillosus	Documented	Surveys Not Practical. 1
Rhizopogon variabilisporus	Suspected	Surveys Not Practical. 1
Sarcodon fuscoindicus	Documented	Surveys Not Practical. 1
Lichens		
Buellia oidalea	Suspected	None Observed
Lecanora pringlei	Suspected	None Observed
Lecidea dolodes	Suspected	None Observed
Leptogium rivale	Documented	None Observed
Leptogium teretiusculum	Documented	None Observed
Peltula euploca	Suspected	None Observed
Vezdaea stipitata	Documented	None Observed
Vascular Plants		
Camissonia ovata	Suspected	None Observed
Frasera umpquaensis	Suspected	None Observed

[1] Surveys are considered not practical for these species based on the 2003 Annual Species Review (IM-OR-2004-034).

Appendix E. Map Packet Table of Contents

Northeast Elk Commercial Thinning and Density Management Project

Timber Sale Plan & Road Map



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Legend

- Bear Bones
- Bucko
- General Lee
- Cox Pit
- Mr. Bennet
- Haul Routes
- Roads
- County Road
- Roseburg BLM District Boundary
- Township/Range
- Section

Administered Lands

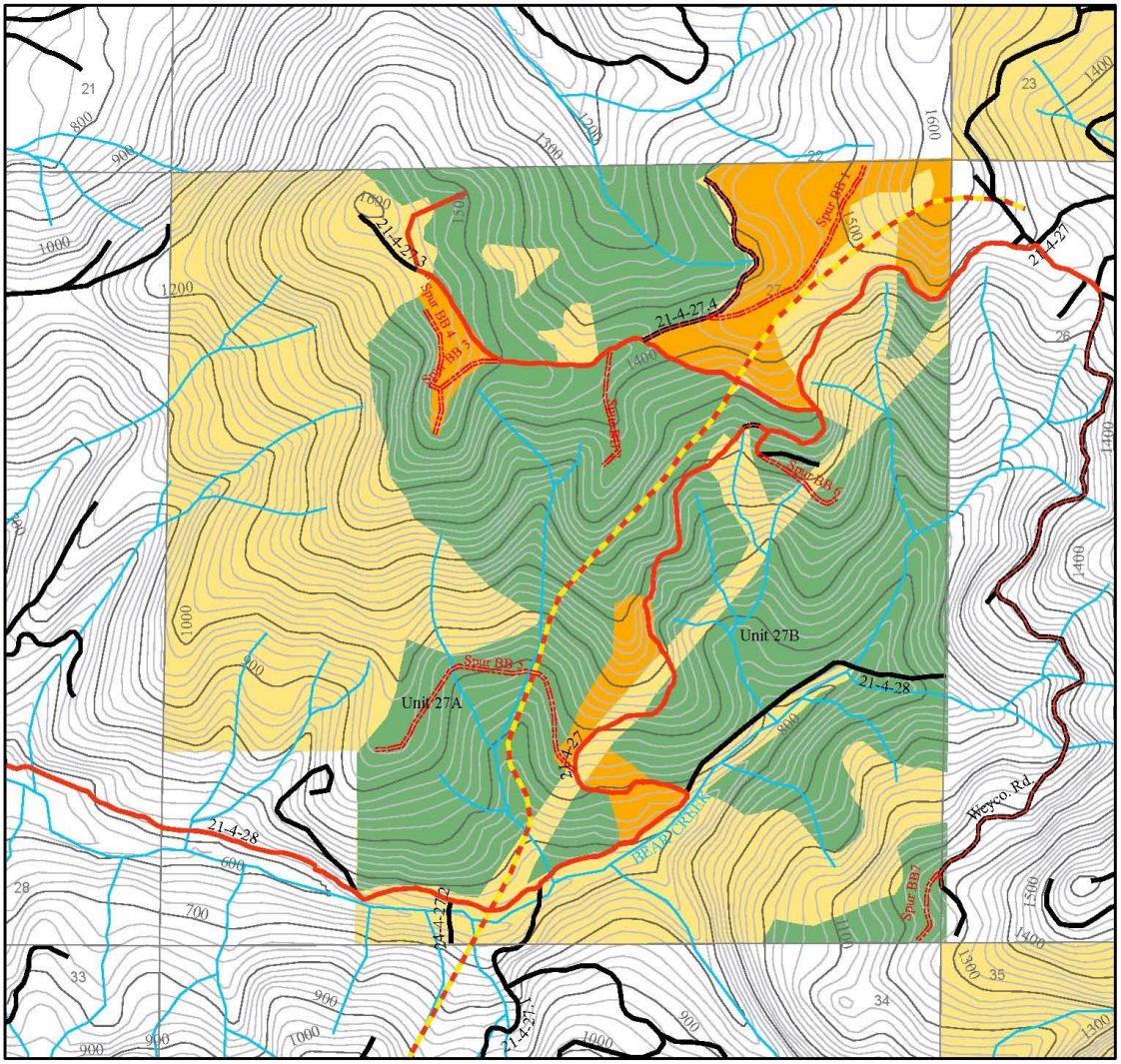
- BLM
- Other

Bear Bones Density Management

Timber Sale Plan & Road Map

R4W

T21S



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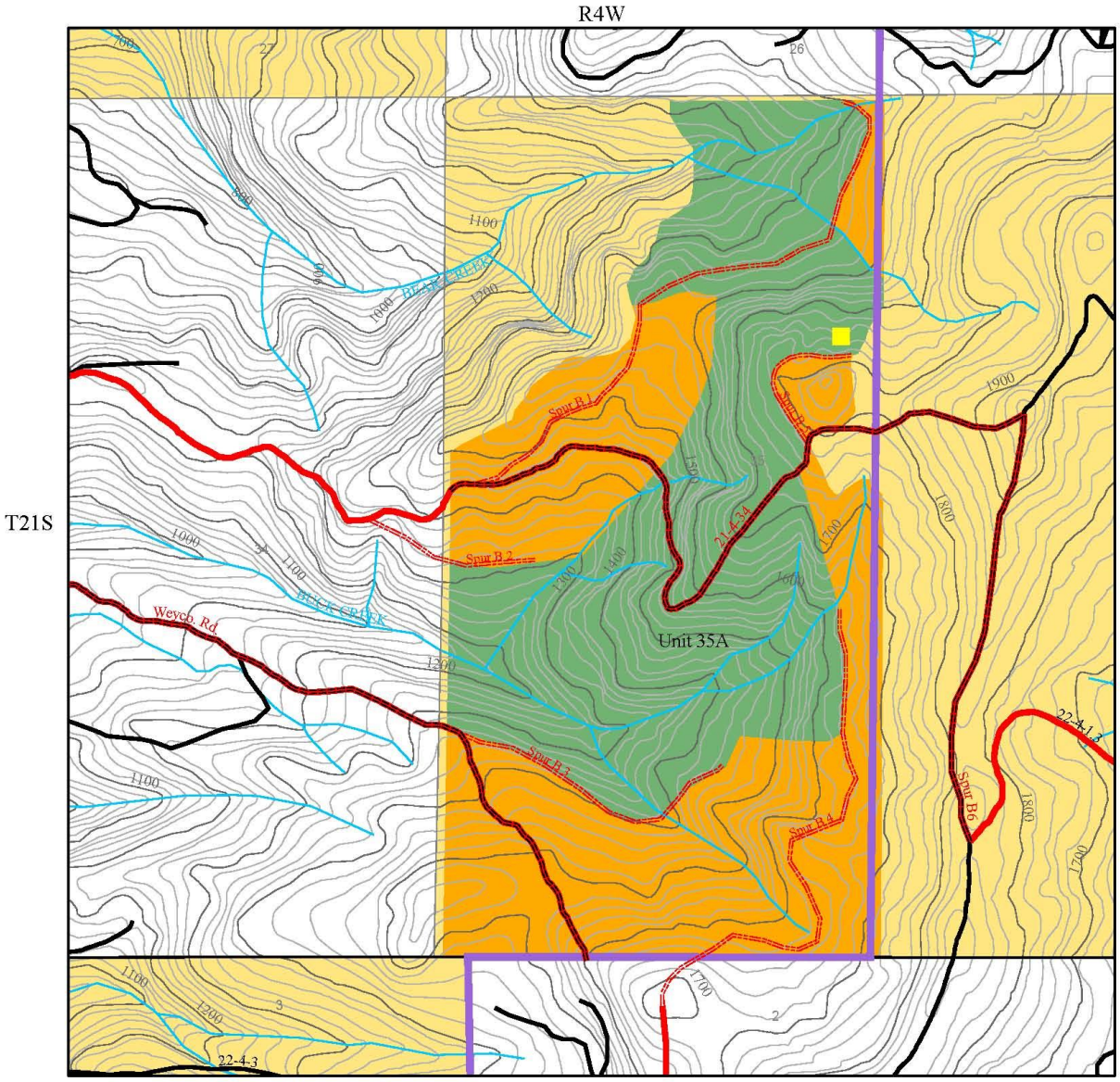
Legend

Bear Bones	Streams
Logging System	NaturalGasPipeline
Cable	Administered Lands
Ground Based	BLM
Roads	Other
Haul Routes	Township/Range
Road Renovation	Section
New Road Construction	

Bucko Density Management

Timber Sale Plan & Road Map



Legend

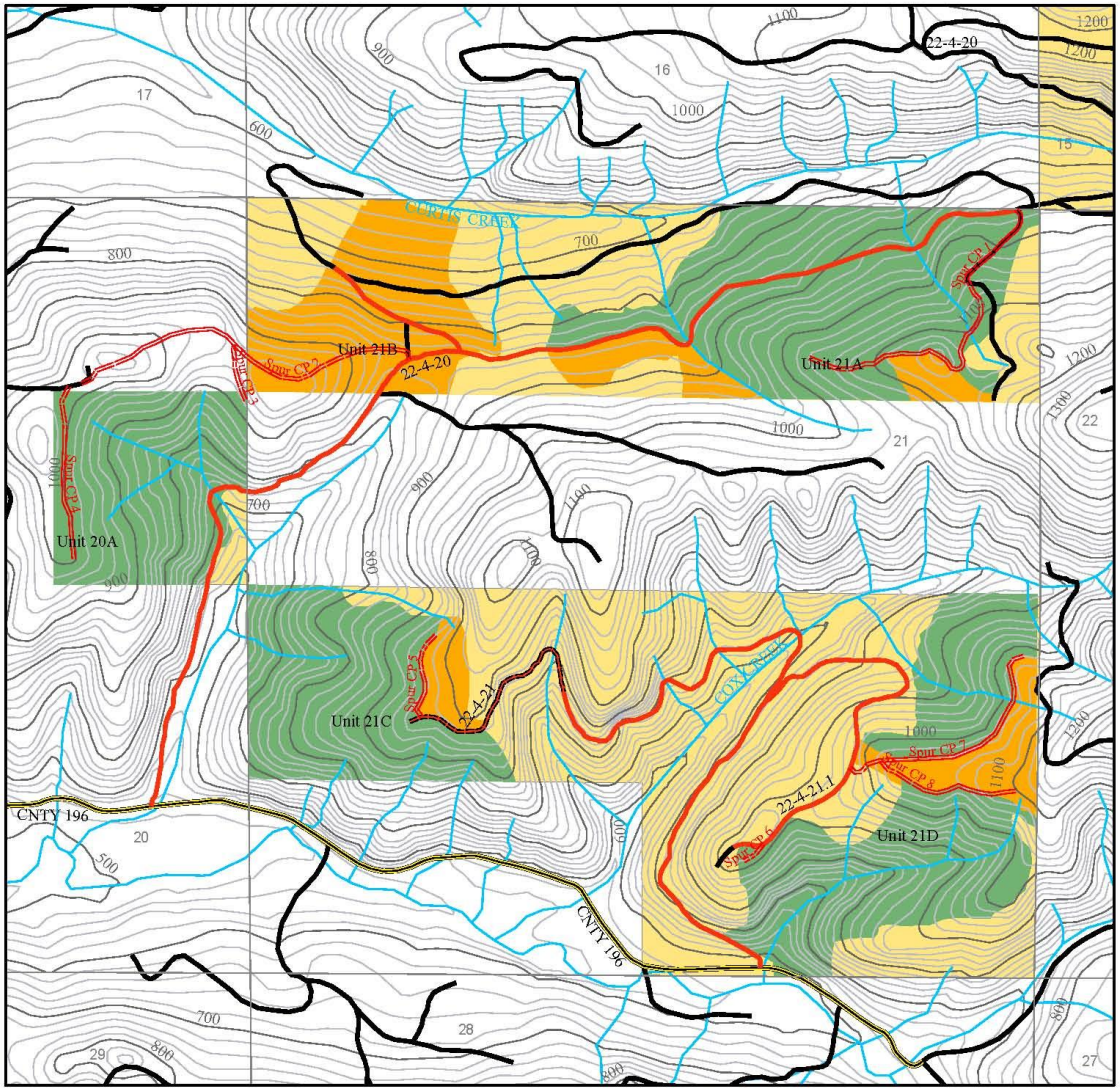
Bucko Logging System	Streams
Cable	FGNW
Ground	Roseburg BLM District Boundary
Roads	Township/Range
Road Renovation	Section
New Road Construction	Administered Lands
Haul Routes	BLM
	Other

Cox Pit Density Management

Timber Sale Plan & Road Map

R4W

T22S



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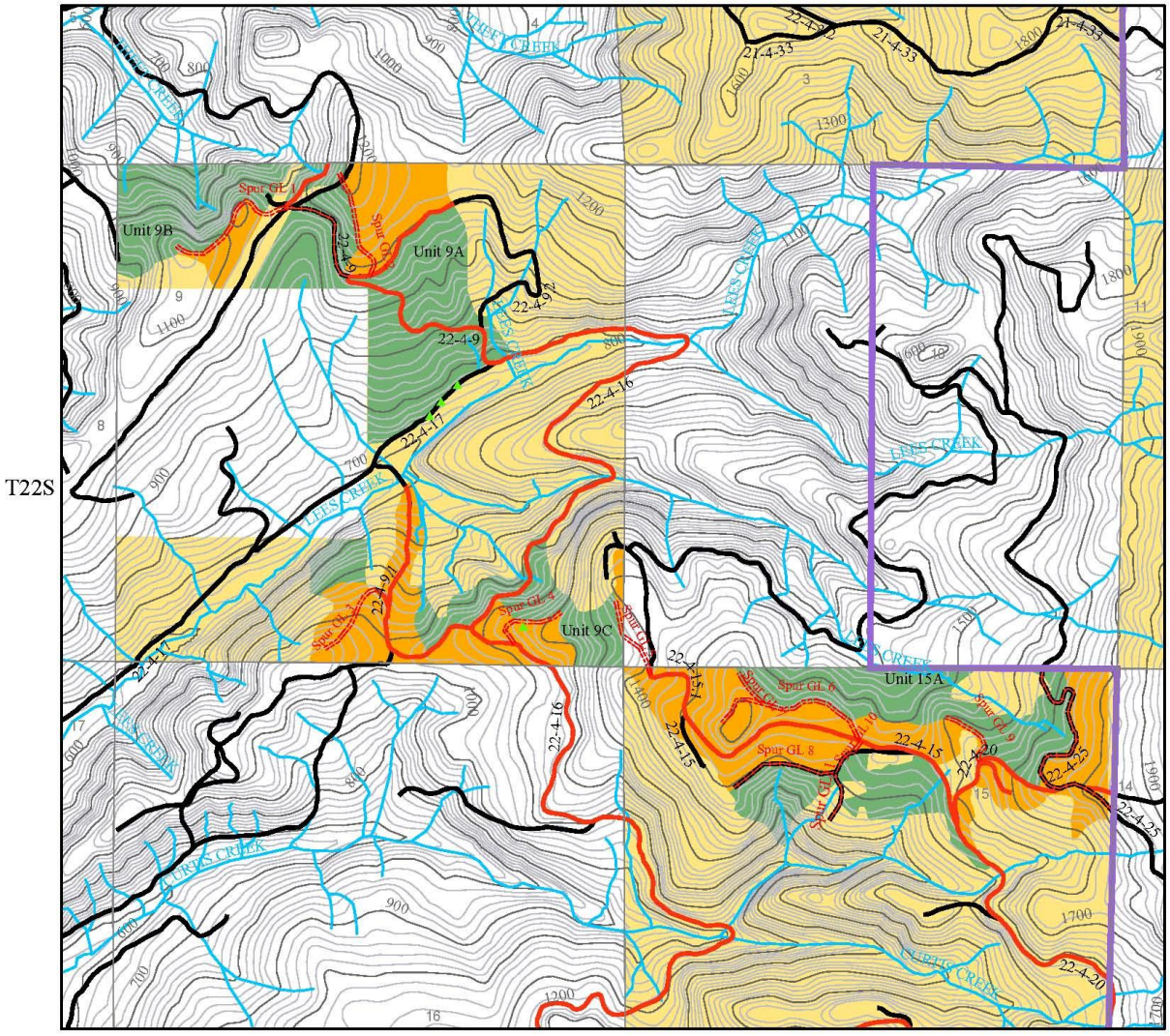
Legend

- Cox Pit
- Logging System
  - Cable
  - Ground Based
  - Roads
  - Road Renovation
  - New Road Construction
  - Haul Routes
- Streams
- Township/Range
- Section
- Administered Lands
  - BLM
  - Other

General Lee Density Management

Timber Sale Plan & Road Map

R4W



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1:18,000

Legend

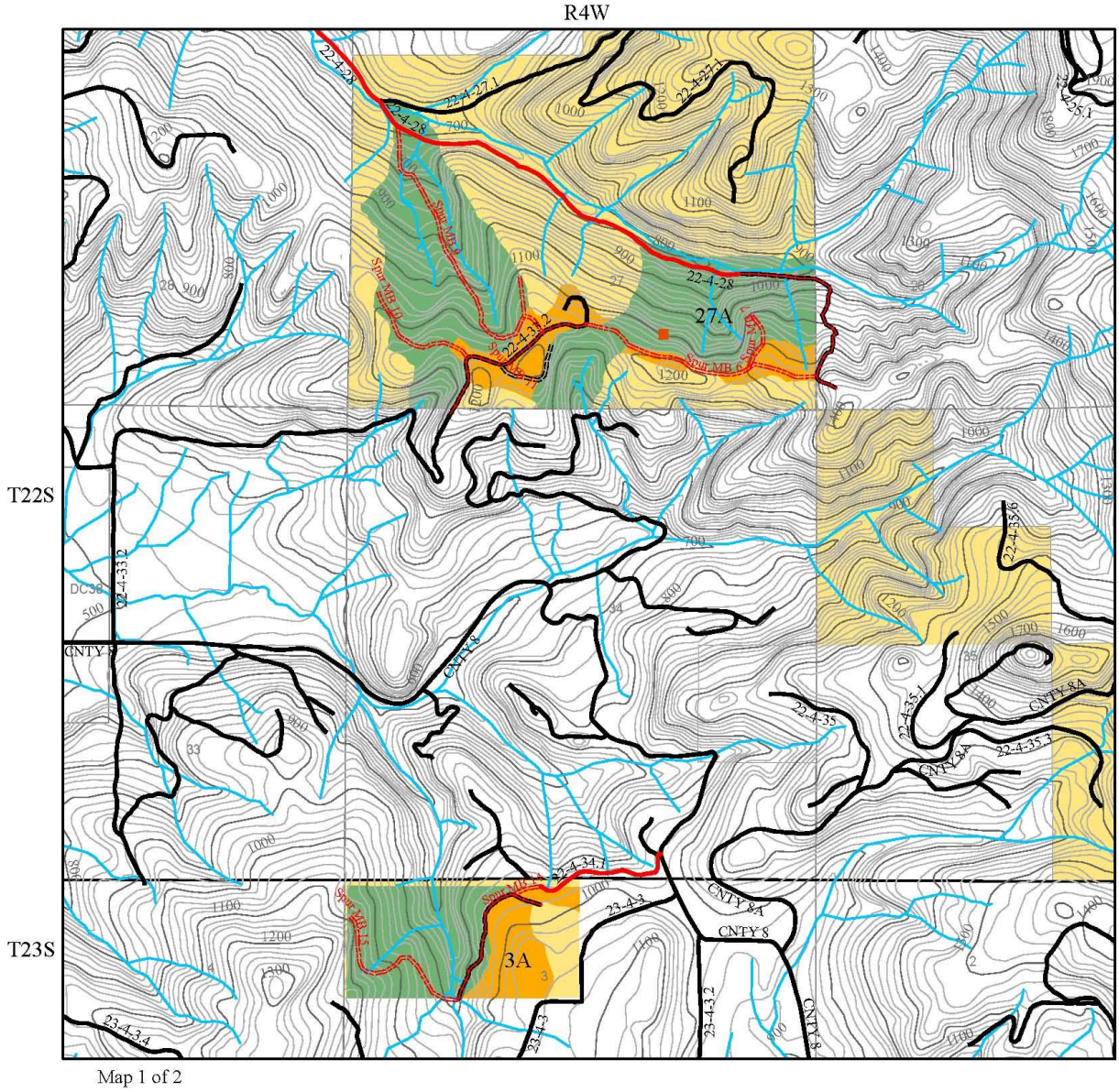
General Lee Logging System
- Cable
- Ground Based
- Roads
- Road Renovation
- New Road Construction
- Haul Routes

- Streams
- Hairy Sedge (Carex gynodynama) Locations
- Township/Range
- Section

Administered Lands
- BLM
- Other
- Roseburg BLM District Boundary

Mr. Bennet Density Management

Timber Sale Plan & Road Map



Map 1 of 2

0 1,000 2,000 3,000 4,000 Feet

1:18,000

N W E S

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

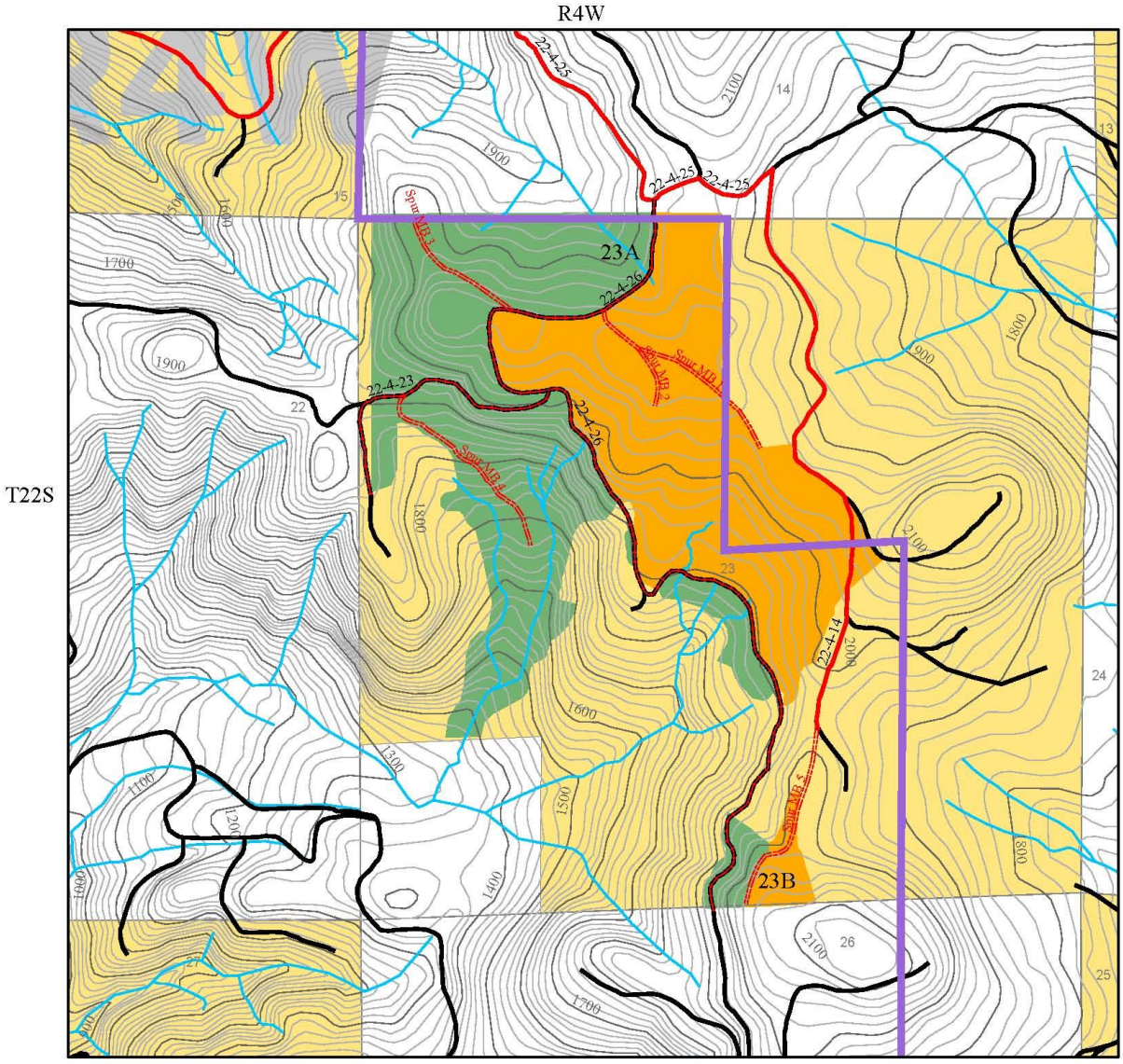
Legend

Mr Bennet Logging System
- Cable
- Ground Based
- Roads
- Road Renovation
- New Road Construction
- Haul Routes

- Streams
- FPNW
- Township/Range
- Section
- BLM
- Other
- Roseburg BLM District Boundary

Mr. Bennet Density Management

Timber Sale Plan & Road Map



Map 2 of 2

0 1,000 2,000 3,000 Feet

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Legend

Mr Bennet Logging System
- Cable
- Ground Based
- Roads
- Road Renovation
- New Road Construction
- Haul Routes

- Streams
- Township/Range
- Section
- BLM
- Other
- Roseburg BLM District Boundary